

THE NORTH AMERICAN ASCLEPIADACEAE

I. PERSPECTIVE OF THE GENERA

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INTRODUCTION

The problem of the North American genera of Asclepiadaceae has been summarized well by Standley (*Fl. Costa Rica* 3: 949. 1938): "The family is noteworthy for the complicated structure of the flowers, more complicated, probably, than those of any other family of plants. The Mexican and Central American members of the group have never been monographed properly, and their classification is at present in a decidedly chaotic state."

It is unfortunate that Charles Darwin did not compose a study on the floral structure and pollination of Asclepiads as a companion to his famous observations on Orchids. In both groups, as distantly related as Dicotyledons and Monocotyledons may be, entomophily has produced elaborate and variable innovations from group to group. But apparently with the same intention: for the attraction of insects and cross-fecundation by them, through means of a pollinium.

The Orchids have responded to entomophily largely by zygomorphy and elaboration of the perianth. In the Asclepiads, on the other hand, actinomorphy has been retained, and, although corolline modifications are obvious, diversification is due chiefly to the structural plasticity of the staminal filaments. These elaborations of the stamens are known as the corona. Since the anthers of Asclepiads are invariably five in number, it obtains that the corona also is five-parted, the segments being quite free or mutually coherent, and diversified in ways that are too numerous for description. Although a staminal corona is the rule for the group, a few entities possess

simple filaments. In any event, the center of the flower is occupied by a composite structure known as the gynostegium, comparable to the column of Orchids. This consists of the five coherent stamens surrounding the style of the bicarpellate pistil, with an enlarged terminal "stigma head" at the free end. The whole stigma head is not truly stigmatic, the receptive surfaces being five narrow strips of glandular tissue between the contiguous anthers.

The anthers of American Asclepiads are bilocular, and within each cavity the pollen grains are grouped at maturity into a glutinous, sac-shaped pollinium of definite form and size. In the subfamily Cynanchoideae, containing all the New World species, these pollinia are combined by pairs through a more or less elaborate yoke mechanism called the translator. The translators consist of two arms* attached to their respective pollinia, and are themselves joined by a roughly sagittate body called the "gland."* A pair of pollinia, therefore, consists of the contents of adjacent anther cavities of contiguous anthers. The translators, with their glands, are formed between the neighboring anthers.

The current explanation of the formation of the translators is that their substance consists of the solidified secretion of special glandular cells located upon the stigma head. Investigations of my own, not yet completed, lead me to assume that in the early development of the pollinia the tapetal liquid, characteristically abundant in young anthers, seeps through small pores of the neighboring anthers to gather in the commissural grooves of the two organs. This liquid later solidifies outside the anther as well as about the pollen, instead of being absorbed as is usually the case. Superficial support is given this view by the fact that the uniting "gland" always is distinctly 2-parted. According to either view, the translators are moulded when still in the liquid state by the available spaces between the young anthers.

* "Translator arm" and "gland" frequently are called "retinaculum" and "corpusculum" respectively in the literature. The former are chosen here as being somewhat more easily associated with the appearance of the structures as well as more adaptable to English: the latter are more useful in Latin diagnoses.

When the pairs of pollinia are mature they are easily removed from the dehiscent anthers by means of the yoke-like translators. A visiting insect may be observed to pull them out and carry them away suspended from its legs. On the same or another flower, the pollinium must be inserted between the anthers at the stigmatic surface, in order to insure pollination. At that time, in response to the stigmatic secretions, pollen tubes germinate from the pollinium while still intact, to travel down the style to the ovules. The significance of the pollinia and their method of fecundation were fully appreciated for the first time by Robert Brown (*Mem. Wern. Soc.* 1: 12-58. 1809) in his celebrated paper distinguishing the Asclepiads from the Apocynads.

The method of pollination in Asclepiads which Robert Brown disclosed appears at first sight to be of design so cunning that great fecundity of the plants should be assured, as well as frequent hybridization. Every conceivable innovation would seem to have been made by the flowers to insure successful insect ministrations. But such does not necessarily seem to have resulted. The family as a whole is outstanding for the constancy of its species and the rarity of obvious hybridity. Furthermore, the amount of fruit produced scarcely seems to be commensurate with the "efforts" taken to insure it, to speak anthropocentrically.

Accounts of the pollination of Asclepiads seldom mention the actual difficulties intervening: the danger of the pollinia being broken or only partially withdrawn by the insect's casual visits; the horny margins of the anthers which seclude the stigma, frequently with entangling hooked or grooved decorations.

Germinated pollinia are conspicuous, even in dried and boiled material, because of the abundant, felty pollen tubes. Amongst the hundreds of flowers of various genera and species which I have dissected under magnification, I have found very few indeed bearing germinated pollinia in the stigmatic chamber between the anthers. Of those few, the companion pollinium was usually in place in its mother anther sac. In nu-

merous instances I have found germinated pollinia while still within the anther sac. Whether such pollen tubes can reach the ovules successfully has not been ascertained, but it is not impossible. Such observations explain to some extent the rarity of hybridization, but fail to shed much light on the use of the pollinia as agents for pollination by insects.

Another feature of the Asclepiad flower which would appear to have little positive survival value is the division of the stigma into five rather restricted receptive regions. This apparently is responsible for the fact that only one follicle commonly develops from the two carpels of the pollinated pistil. Thus, even though three stigmatic surfaces were to receive pollinia, fecundation of only one carpel might result: but it must be confessed that conversely were only two pollinia deposited development of both follicles might ensue. A pair of follicles, nevertheless, is seldom encountered. Perhaps it is safe to assume that the reduction in number of fruits is compensated by the volatility of the comose seeds.

The classification of Asclepiadaceae into major divisions is based upon the nature and position of the pollinia, and thus owes its foundations to the classical observations of Robert Brown (Mem. Wern. Soc. 1: 12-58. 1809). That versatile genius separated the family as it is now recognized into five tribes: Periploceae, with open cornucopia-shaped pollinia and adhesive translators somewhat as in the Orchids; Secamoneae, with 4-locular anthers, the yoke-like translators bearing two pollinia upon each arm; Asclepiadeae Verae, with 2-locular anthers, the yoke-like translators bearing a single pendulous pollinium upon each arm; Gonolobeae, with pollinia similar to those of Asclepiadeae Verae, but horizontal; and Stapelieae, with similar, but erect pollinia. Recent systems (cf. K. Schumann, in Engl. & Prantl, Nat. Pflanzenfam. 4²: 209. 1895) have divided the family into two subfamilies, Periplocoideae and Cynanchoideae; the latter having four tribes, Asclepiadeae, Secamoneae, Tylophoreae (Stapelieae of Brown), and Gonolobeae. In the New World only the Cynanchoideae are encountered in the native flora, with the three tribes Asclepiadeae, Gonolobeae, and Tylophoreae.

In these studies no attempt will be made to subdivide the tribes into the smaller subdivisions advocated by Schumann, for these are manifestly unnatural. Thus the genus *Sarcostemma* R.Br. (sensu stricto) was placed in the subtribe *Cynanchinae* of *Asclepiadeae* by that author (K. Sch. in Engl. & Prantl, Nat. Pflanzenfam. 4²: 245. 1895), but the two certainly synonymous genera, *Philibertia* HBK. and *Funastrum* Fourn., in the *Glossonematinae* and the *Asclepiadinae* respectively (pp. 225, 231. loc. cit.). I am inclined also to ignore Schumann's subtribe *Astephaninae*, characterized by the absence of a corona, since in all cases which I have observed the absence of a crown is the only character separating species groups of obviously close affinity, notably in the inclusive treatment of *Cynanchum* adopted here. One monotypic genus, *Tylodontia* Griseb. (treated as a division of *Cynanchum* here), Schumann includes in the *Astephaninae*, but I have observed the presence of definite corona segments in an isotype deposited in the herbarium of the Missouri Botanical Garden (*Wright 2964*). Neither can *Oxypetalinae* of Schumann be maintained by the appendages of the translator arms, since several South American species of the single genus, *Oxypetalum*, do not have those structures.

The separation of the American *Asclepiads* into tribes sometimes is a bit difficult, since the position of the pollinia usually must be observed while they are still within the anther sac. Once withdrawn and placed upon the dissecting stage, the delicate translator arms are apt to twist into any conceivable attitude, frequently giving a false impression of their natural position. The *Asclepiadeae* and *Tylophoreae* usually are quite easy to detect; but the *Gonolobeae* have given trouble from the start. I am willing to be convinced that the normal position of the *Gonoloboid* pollinium may be truly horizontal, although my interpretation of the tribe includes forms with pollinia that range in position from pendulous to ascending. By far the best means that I have found to separate this tribe is by means of the structure, not the position, of the pollinia.

In all the *Asclepiadeae* and *Tylophoreae* examined by me, the faces of the pollinium are uniformly rounded or flattened on

either side, and the translator arm makes a sharply definite connection with them. In the Gonolobeae, on the other hand, the faces of the pollinium are more or less dissimilar: one convex or rounded and the other flattened or somewhat excavated, frequently very strikingly so. In some cases both sides are deeply furrowed or excavated. In the Gonolobeae, also, the translator arm usually engages the pollinium more gradually, the attachment being marked by a more or less conspicuous hyaline indentation or margin (always the upper). Without the use of this structural criterion, Schumann placed such genera as *Macroscepis* and *Fischeria* in the Asclepiadeae and *Metalepis* in the Gonolobeae, whereas other characters of the plants show their natural positions to be exactly the reverse, as shall be explained presently.

At this writing ninety-seven genera of Asclepiadaceae have been described from North America, based wholly or in large part upon the structure of the corona. Authors of the great majority of these genera seem not to have understood what a versatile feature this organ is, for it is only when its multifarious aspects are interpreted in a broad and comparative manner that a natural and conveniently referable classification can result. North American students of tropical Asclepiads, particularly, would do well to consider the floral variability of the native Milkweeds before attempting the description of exotic genera. The prospective Asclepiadologist should understand from the first that differences of the corona separate species in this family, which would form remarkable generic criteria, say of the "disc" in other families. After the first shock of surprise at the few genera recognized for North America, readers of the following key to genera may notice the fairly incidental use of corona characters. These are reserved chiefly for subgeneric and sectional distinctions, and will be discussed in that connection.

The term "corona" has been taken in a rather restricted sense in these studies. Amongst earlier literature frequent mention is made of "double" or even of "triple" coronas. This terminology is very confusing except to the authors concerned. Morphologically, the corona, as interpreted here,

consists of various elaborations or enations of the staminal filaments only. These enations may occur as separate bodies attached to the staminal column, as in *Asclepias*, to cite a familiar example, or may consist of a more or less entire ring of tissue adnate to the bases of both staminal column and corolla throat. Where "double" or "triple" coronas have been described by various authors, these usually will be found to consist of a faucal annulus of the corolla tube, or sterile appendages of the anthers, which are rather to be called such than to be referred to as corona.

The most cogent reason for avoiding the use of "corona," except in a simple sense, is that many readers of the literature are apt to interpret a corona as double, whilst the author may not intend such a view. Several instances of possible or published confusion arising from an author's use of "double corona" come to mind. In the subgenus *Chthamalia* of *Matelea*, for example, the corona consists of an annular structure of five more or less united and variously constituted segments, each of which bears internally a more or less conspicuous ligular process, sometimes surpassing the height of the subtending segment. Contrary to what one might suppose, this complex structure is not considered by the literature as a "double corona." The flowers of *Gonolobus* (sensu stricto) are very difficult to identify with standard keys, for they usually possess (1) a faucal annulus of the corolla, (2) a fleshy, true corona, (3) dorsally appendaged anthers. Some authors interpret these structures as constituting a "triple" and some as a "double" corona. Those maintaining the dual nature may construe either the corolline annulus or the anther appendages as the supernumerary corona, in which cases the true corona will be spoken of as either the "inner" or the "outer" corona, respectively.

The segregate genus *Podostigma*, of the southeastern United States, is keyed by K. Schumann (in Engl. & Prantl, Nat. Pflanzenfam. 4²: 235. 1895) on the basis of having an "inner corona" borne high upon the column, alternate with the anthers. When these tiny objects are examined, however, they are found to be nothing but the minute ligules commonly alter-

nating with the corona hoods in *Asclepias* proper, their normal position doubtless having been disturbed by the elongation of the anther stipe* above the insertion of the hoods. In *Fischeria*, also a "double corona" is described in all texts. But when carefully dissected, the bladder-like "inner corona segments" are found to be nothing but the hypertrophied anthers themselves. This peculiar mark of *Fischeria* may be described more accurately and more clearly upon the basis of anther structure than by introducing an ambiguous and morphologically indefensible reference to supposed "corona."

The North American Asclepiadaceae have never had the attentions of a specialist devoted primarily to their study, except for the period between 1897 and 1904 during which a series of eight short papers by Miss Anna Murray Vail appeared in the 'Bulletin of the Torrey Botanical Club.' These papers consist only of short notes, with the exception of rather casual revisions of *Acerates*, the *Asclepias verticillata* complex, and *Rouliniella* (i.e. *Cynanchum* subgenus *Mellichampia*, in part, of my studies). Even from these small and interrupted beginnings, it is obvious that Miss Vail possessed a very considerable knowledge and insight into the North American Asclepiads, and it is regrettable that her retirement to France terminated her ambitions for more comprehensive works. I must confess that more than once, when I was apparently undergoing swift mental attrition because of the damnably variable coronas and pollinia, I have reflected on my predecessor's retreat to the Riviera.

The South American and Antillean Asclepiads have had several specialists, including Decaisne, Fournier, Schlechter, and Malme; to these must be added the contemporary South American botanists, A. G. Schulz and F. C. Hoehne. The work of these eminent systematists, however, has nearly always been in the field of regional floristics, with few exceptions, such as Malme's monograph and subsequent emendations on *Oxy-*

* I have found it convenient in dealing with some genera to distinguish two regions of the staminal column: that below the attachment of the corona as the "column," as in most species of *Asclepias* proper, and that above, between the corona and the anthers proper, as the "stipe," as in *Podostigma*.

petalum. But these contributions have affected the northern Asclepiads only in rather minor particulars. Regional floras of North America have included thoughtful interpretations of the Asclepiadaceae in several instances, but have been hindered by their restricted scope and the divided interest of their authors.

Special mention should be made here to the monograph of *Marsdenia* by Rothe (in Engl. Bot. Jahrb. 52: 354–434. 1915), not only since it is the only comprehensive account of an Asclepiad genus in both American continents, but because the author's solution of the problems of this group closely parallel my own for the family. Confronted by an aggregation of eight segregate genera, nearly all in current use but with very evasive criteria when seen as a whole, Rothe courageously combined them as sections. The result, in spite of some imperfections, is the one bright spot in the determination of tropical American Asclepiads from the existing literature. In the Tylophoreae, at least, one needs no longer to puzzle over the generic interpretation of floral innovations, nor fear that the specimen he is trying to determine may already be described as a new genus in some remote section of the taxonomic indices. At the same time, a natural system of species groups is defined and provided with names which may (or should) be used in the description of novelties, or to which additions may even be made should sufficiently discrepitant plants be found.

A lifetime would be too short to perfect a complete system of the North American Asclepiads. But after an intensive study of several years, I have arrived at a definition of the genera which I believe may well lead to a more adequate understanding of the complex as a whole. The result is a revolutionary change in nomenclature which surely will not be regretted more by the reader than by the author. The change clearly is unavoidable because of the long neglect of the family.

In this group of plants apparent entomophily has produced a floral structure even more complicated and variable than in the Orchids. Morphological details separate species and even varieties here, which would serve to distinguish genera in other groups of Flowering Plants. The student of the Asclepiads is

impelled to the defeatist attitude that only two choices are available in classification: to "lump" genera or to "split" them. If he continues the study of Milkweeds sufficiently long, he probably will find himself tossed from horn to horn of the dilemma.

After several such harrowing experiences, I have recognized that a narrow concept of coronal structure as a criterion of genera, if pursued consistently, will lead to a multitude of monotypic entities—as a matter of fact, that few genera will consist of more than two or three species—and that each new species will introduce anew the question of generic differentiation. This is scarcely an exaggeration when one remembers that an inclusive concept of North American *Asclepias*, alone, involves the listing of twenty generic synonyms. If he contemplates an extended association with the Asclepiadaceae, with yearly increments of specimens brought to his attention for classifying, even the most hardened "liberal" taxonomist will take heed before embarking upon such a disastrous course.

Although the results of my studies wreak havoc upon the existing classification, I feel confident that the groups proposed are natural, and that they will stand the test of many years. The desideratum of stability and convenience will be served much better in having a few, almost infallibly recognizable genera even though they may be large: the natural affinities within these groups may be indicated sufficiently by the erection of subgenera and sections.

This paper is intended as the forerunner of a series devoted to the North American Asclepiadaceae. It is composed as a general survey of the generic elements involved, together with an indication of representative changes in nomenclature made necessary by my visualization of the natural system of the family. These species are drawn only from those with which I am familiar at this time, and should not be considered as complete synopses; neither do they include species not requiring adjustment in terminology. The synonymy, also, is not complete, consisting merely of the name-bringing and other more prominent synonyms. To some readers, the inclusion of the many nomenclatural changes upon such a scanty prepara-

tion may seem precipitate. The decision to include them here, rather than to withhold them for subsequent, complete revisions, has been made in view of the advantages of concrete illustration of the generic elements proposed, the uncertainty of our ability to obtain European types necessary for a complete study within the near future, and the validation of obviously necessary names for the purpose of present determinative work. Should the future permit, this paper will be followed by a monograph of the North American species of *Asclepias*, and by subsequent revisions of the other important genera, in each case with all recognized species illustrated by analytical drawings.

To be of wide use, a critical study of the Asclepiadaceae should be illustrated profusely. I feel that an apology is in order, therefore, because of the total lack of analytical drawings in this paper. Their absence is due in part to the conditions of publication at the moment, and in part to plans which I have made for their inclusion in future studies. After all, this paper is scarcely more than an annotated key to genera, and of little interest save to specialists. Such readers will be sufficiently familiar with the structures to which I call attention not to miss the figures.

KEY TO THE TRIBES AND GENERA

- Pollinia strictly pendulous, their faces uniformly flattened or rounded, uniformly fertile to the attachment of the translators..... ASCLEPIADEAE
 Pollinia usually horizontal or essentially so, occasionally ascending or descending, but one or both faces more or less excavated, and with a sterile hyaline margin or indentation near the attachment of the translators.... GONOLOBEAE
 Pollinia strictly erect, their faces uniformly rounded, uniformly fertile to the attachment of the translators..... TYLOPHOREAE

ASCLEPIADEAE

- Erect or decumbent perennial herbs; pollinia very strongly flattened; corona of 5 cucullate, calceolate, or clavate hoods, usually with an internal horn or crest..... I. ASCLEPIAS
 Lianas or twining undershrubs; pollinia faces broadly rounded or only slightly compressed.

- Arms of translators conspicuously thickened and appendaged near their attachment to the gland..... II. OXYPETALUM

Arms of translators not as above.

- Corona of 5 separate or united, laminate to filiform scales, occasionally compounded or with internal processes, rarely wholly lacking.....III. CYNANCHUM
 Corona of 5 semi-vesicular sacs attached separately to the backs of the anthers.....IV. BLEPHARODON
 Corona of 5 closed inflated vesicles joined at the bases by a fleshy ring adnate to the corolla-throat.....V. SARCOSTEMMA

GONOLOBEAE

- Anthers relatively simple, not conspicuously vesicular, nor with dorsal appendages; corolla lobes various, but not crisped.....VI. MATELEA
 Anthers very conspicuously hypertrophied and vesicular throughout; corolla lobes strikingly crisped.....VII. FISCHERIA
 Anthers with spreading, more or less laminate, fleshy dorsal appendages; corolla lobes various, but not crisped.....VIII. GONOLOBUS

TYLOPHOREAE

- One genus.....IX. MARSDENIA

I have been unable to interpret two enigmatic genera of Baillon, *Microstelma* (Hist. Pl. 10: 286. 1891) and *Stelmagonum* (loc. cit. 287), both placed in the Gonolobeae and thus probably synonymous under *Matelea*.

I. ASCLEPIAS L. Sp. Pl. 214. 1753.

- Anthanotis* Raf. Fl. Ludov. 52, 149. 1817.
Anantherix Nutt. Gen. N. Am. Pl. 1: 169. 1818.
Stylandra Nutt. loc. cit. 170. 1818.
Otaria HBK. Nov. Gen. 3: 192. 1819.
Acerates Ell. Sketch Bot. S. Carol. 1: 316. 1821.
Podostigma Ell. loc. cit. 326. 1821.
Acerotis Raf. New Fl. N. Am. 1: 49. 1836.
Oligoron Raf. loc. cit. 4: 60. 1836.
Otanema Raf. loc. cit. 61. 1836.
Onistis Raf. loc. cit. 63. 1836.
Polyotus Nutt. Trans. Amer. Phil. Soc. n.s. 5: 199. 1837.
Asclepiodora A.Gray, Proc. Amer. Acad. 12: 66. 1877.

Schizonotus A.Gray, loc. cit. 1877, non Lindl.

Solanoa Greene, Pittonia 2: 67. 1890.

Solanoana O.Ktze. Rev. Gen. 2: 421. 1891.

Oxypteryx Greene, Pittonia 3: 234. 1897.

Podostemma Greene, loc. cit. 235. 1897.

Biventraria Small, Man. Fl. 1072. 1933.

Asclepiodella Small, loc. cit. 1073. 1933.

Gomphocarpus of American authors.

KEY TO THE SUBGENERA

- A. Corolla rotate to rotate-subcampanulate, the lobes reflexed to somewhat ascending; corona attached to the column immediately beneath the anther head.
- B. Hoods cucullate or cucullate-spatulate to calceolate, rarely strongly conduplicate, erect to spreading, the alternate lobules more or less deeply 2-cleft, rarely absent.
- C. Corolla throat without internal callous processes.
- D. Hoods usually more or less substipitate as seen from within, the basal attachment shallow, conduplicate but not deeply saccate
.....1. EUASCLEPIAS
- DD. Hoods very sessile, the basal attachment deeply saccate.
- E. Hoods entire to somewhat cleft ventrally, open but occasionally appressed against the column.
- F. Base of hoods not appendiculate, or merely somewhat keeled laterally.
- G. Hoods with a more or less conspicuous internal horn or crest.
- H. Horn or crest compressed radially; column not deeply saccate between the hoods.....2. ASCLEPIODELLA
- HH. Horn or crest compressed tangentially; column deeply saccate between the hoods.....3. PENTASTOMATIA
- GG. Hoods without a horn or crest.
- H. Hoods with very pronounced marginal lobes, the orifice not appressed against the column..4. ASCLEPIOPHANES
- HH. Hoods with very inconspicuous marginal lobes, if any, the orifice appressed against the column.....5. ACERATES
- FF. Base of hoods with conspicuous, external, laterally excurrent membranous appendages.....6. POLYOTUS
- EE. Hoods almost completely bifid ventrally, closed, completely enclosing the horn if present.....7. SOLANOA
- CC. Corolla with an interrupted faucal annulus of 5 conspicuous callous processes alternating with the hoods; hoods strongly conduplicate, with a conspicuous radially compressed crest....8. ASCLEPIODOLUS
- BB. Hoods thickly involute-clavate.
- C. Corolla lobes reflexed; hoods with deeply bifid alternating lobules; translator arms very long.....9. ANANTHERIX

- CC. Corolla lobes ascending; hoods with entire alternating lobules; translator arms of moderate length.....10. ASCLEPIODORA
 AA. Corolla rotate-subtubular, the lobes erect or only slightly spreading; anther head borne on a slender stipe high above the corona.....
11. PODOSTIGMA

This key will not be of great use to those who are not thoroughly familiar with the varying structure of the Milkweed flower. The monograph of the genus which I am preparing will contain the discussion and illustrations of the criteria necessary for general use.

To many readers familiar with the segregate genera of *Asclepias* in a restricted region of the United States, the reduction of such well-established entities as *Acerates*, *Asclepiodora*, and *Podostigma* may appear as an admission of casual superficiality. Let them study the scores of species of *Asclepias* represented in North America, intensively, for several years, however (and above all, let them attempt to compose an adequate key even to subgenera and sections), and I am convinced that those without prejudice will appreciate the practical and theoretical advantages of "lumping." Fortunately, very few new combinations are necessary by interpreting the genus in a broad sense, for practically all species have been described under *Asclepias* at one time or another. The relatively few exceptions amongst the species with which I am familiar at present are treated under their respective subgenera as follows:

SUBGENUS 1. EUASCLEPIAS

ASCLEPIAS **hypoleuca** (A.Gray) Woodson, comb. nov.

Gomphocarpus hypoleucus A.Gray, Proc. Amer. Acad. **17**: 222. 1881-82.

ASCLEPIAS **Phenax** Woodson, nom. nov.

Acerates humilis Benth. Pl. Hartw. 291. 1848, non *Asclepias humilis* Schltr.

ASCLEPIAS **Pringlei** (Greenm.) Woodson, comb. nov.

Acerates Pringlei Greenm. Proc. Amer. Acad. **34**: 570. 1899.

SUBGENUS 5. ACERATES

ASCLEPIAS **hirtella** (Pennell) Woodson, comb. nov.

Acerates hirtella Pennell, Bull. Torrey Club **46**: 184. 1919.

SUBGENUS 6. POLYOTUS

ASCLEPIAS **Engelmanniana** Woodson, nom. nov.

Acerates auriculata Engelm. in Torr. Rept. Bot. Mex. Bound. Surv. 160. 1859.

Asclepias auriculata (Engelm.) Holzinger, Bot. Gaz. **17**: 125, 160. 1892, non HBK.

SUBGENUS 7. SOLANOA

ASCLEPIAS **Solanoana** Woodson, nom. nov.

Gomphocarpus purpurascens A.Gray, Proc. Amer. Acad. **10**: 76. 1874, non A.Rich.

Schizonotus purpurascens A.Gray, loc. cit. **12**: 66. 1877.

Solanoa purpurascens (A.Gray) Greene, Pittonia **2**: 67. 1890.

Solanoana purpurascens (A.Gray) O.Ktze. Rev. Gen. **2**: 421. 1891.

SUBGENUS 8. ASCLEPIODOLUS

ASCLEPIAS **insignis** (Brandg.) Woodson, comb. nov.

Asclepiodora insignis Brandg. Zoe **5**: 253. 1908.

SUBGENUS 10. ASCLEPIODORA

ASCLEPIAS **circinalis** (Dene.) Woodson, comb. nov.

Acerates circinalis Dene. Ann. Sci. Nat. Bot. ii. **9**: 322. pl. 10, fig. c. 1838.

Asclepiodora circinalis (Dene.) Fourn. loc. cit. vi. **14**: 369. 1882.

ASCLEPIAS **Fournieri** Woodson, nom. nov.

Acerates gomphocarpoides Dene. Ann. Sci. Nat. Bot. ii **9**: 323. 1838, non *Asclepias gomphocarpoides* Schltr.

Asclepiodora gomphocarpoides (Dene.) Fourn. loc. cit. vi. **14**: 369. 1882.

ASCLEPIAS **zanthodacryon** (Smith & Harris) Woodson, comb. nov.

Asclepiodora zanthodacryon Smith & Harris, Contr. Gray Herb. 114: 12. 1936.

II. OXYPETALUM R.Br. Mem. Wern. Soc. 1: 41. 1809.

Apparently *O. cordifolia* (Vent.) Schltr. is the only representative of this troublesome genus in Central America and the Antilles. Fortunately, this species has strongly appendaged translator arms which enable it to be separated easily from *Cynanchum*. But in South America there are many species without this diagnostic structure, the importance of which will present one of the major problems of the Asclepiads in the southern continent.

III. CYNANCHUM L. Sp. Pl. 212. 1753.

- Ditassa* R.Br. Mem. Wern. Soc. 1: 49. 1809.
Metastelma R.Br. loc. cit. 52. 1809.
Enslenia Nutt. Gen. N. Am. Pl. 1: 164. 1818, non Raf.
Ampelamus Raf. Amer. Monthly Mag. 4: 192. 1819.
Lyonia Ell. Sketch Bot. S. Carol. 1: 316. 1821, non Nutt.
Seutera Reichenb. Consp. 131. 1828.
Enslinia Reichenb. loc. cit. 1828.
Roulinia Dene. in DC. Prodr. 8: 516. 1844, non A. Brongn.
Orthosia Dene. loc. cit. 526. 1844.
Tassadia Dene. loc. cit. 579. 1844.
Irmischia Schlecht. Linnaea 19: 738. 1847.
Nanaturis Turcz. Bull. Soc. Nat. Mosc. 21¹: 254. 1848.
Amphistelma Griseb. Fl. B.W.I. 417. 1861.
Tylodontia Griseb. Cat. Pl. Cub. 175. 1866.
Metalepis Griseb. loc. cit. 179. 1866.
Mellichampia A.Gray, Proc. Amer. Acad. 22: 437. 1887.
Pattalias S.Wats. loc. cit. 24: 60. 1889.
Tainionema Schltr. in Urb. Symb. Ant. 1: 263. 1899.
Decastelma Schltr. loc. cit. 264. 1899.
Rouliniella Vail, Bull. Torrey Club 29: 662. 1902.
Basistelma Bartlett, Proc. Amer. Acad. 44: 631. 1909.
Epicion Small, Man. Fl. 1075. 1933.
Astephanus of American authors.

Besides the preceding, several synonyms eventually will have to be added from the South American flora. Very few of

these synonymous genera are absolutely co-extensive, since they are based for the greater part upon variations of the corona. Because these differences are multitudinous but of the same general *motif*, the practical solution of the problem appears to lie in an inclusive treatment, such as that adopted for *Asclepias*. The principal characters used to separate the segregates just enumerated are aestivation of the corolla lobes (whether contorted or valvate—extremely difficult to observe in most species), corona (whether simple or compound, deeply or less deeply divided, or absent), and structure of the inflorescence (whether racemiform or umbelliform—since the basic structure is cymose for all, this distinction resolves itself into a comparison of internode length). These characters combine kaleidoscopically in so many manners, and frequently result in the separation into different genera of so many species of obvious affinity, that they appear of very doubtful value. I am inclined to discount particularly the value of corolla aestivation and corona structure, and to group the North American species under the following subgenera. These I am illustrating with representative adjustments in nomenclature.

KEY TO THE SUBGENERA

- A. Cymes racemiform to corymbiform, with definitely manifest internodes.
 - B. Corolla campanulate to rotate-subcampanulate, the throat not constricted at the orifice.
 - C. Corona lobes relatively elongate, free or united only at the bases.
 - D. Corona lobes acuminate, entire or with very obscure lateral lobules
.....1. MELLICHAMPIA
 - DD. Corona lobes deeply bifid.....2. AMPELAMUS
 - CC. Corona cyathiform, broadly and shallowly lobed, the lobes broadly emarginate3. METALEPIS
 - BB. Corolla urceolate, the throat constricted at the orifice....4. TYLODONTIA
- AA. Cymes umbelliform, usually without the appearance of definite internodes.
 - B. Corolla lobes ascending or spreading.....5. METASTELMA
 - BB. Corolla lobes inflexed-cucullate.....6. CLEISTOLOBUS

SUBGENUS 1. MELLICHAMPIA

CYNANCHUM jaliscanum (Vail) Woodson, comb. nov.

Rouliniella jaliscana Vail, Bull. Torrey Club **29**: 668.
1902.

- CYNANCHUM jamaicense** (Griseb.) Woodson, comb. nov.
Enslenia jamaicensis Griseb. Fl. B.W.I. 418. 1861.
Rouliniella jamaicensis (Griseb.) Rendle, Journ. Bot. **74**:
340. 1936.
- CYNANCHUM lignosum** (Vail) Woodson, comb. nov.
Rouliniella lignosa Vail, Bull. Torrey Club **29**: 666. 1902.
- CYNANCHUM ligulatum** (Benth.) Woodson, comb. nov.
Enslenia ligulata Benth. Pl. Hartw. 290. 1848.
Mellichampia rubescens A.Gray, Proc. Amer. Acad. **22**:
437. 1887.
Ampelamus ligulatus (Benth.) Heller, Contr. Herb.
Franklin & Marshall Coll. **1**: 79. 1895.
Mellichampia ligulata (Benth.) Vail, Bull. Torrey Club
26: 425. 1899.
Roulinia ligulata (Benth.) Pittier, Contr. U.S. Nat. Herb.
13: 111. 1910, as to synonymy.
- CYNANCHUM Rensoni** (Pittier) Woodson, comb. nov.
Roulinia Rensoni Pittier, Contr. U.S. Nat. Herb. **13**: 101.
1910.
- CYNANCHUM saepimentorum** (Brandg.) Woodson, comb. nov.
Vincetoxicum saepimentorum Brandg. Univ. Cal. Publ.
Bot. **4**: 381. 1913.
- CYNANCHUM sinaloense** (Brandg.) Woodson, comb. nov.
Roulinia sinaloensis Brandg. Zoe **5**: 243. 1908.
Mellichampia sinaloensis (Brandg.) Kearney & Peebles,
Journ. Wash. Acad. Sci. **29**: 488. 1939.
- CYNANCHUM unifarium** (Scheele) Woodson, comb. nov.
Gonolobus unifarius Scheele, Linnaea **21**: 760. 1848.
Roulinia unifaria (Scheele) Engelm. in Torr. Rept. Bot.
Mex. Bound. Surv. 160. 1859.
Rouliniella unifaria (Scheele) Vail, Bull. Torrey Club **29**:
663. 1902.
- CYNANCHUM Watsonianum** Woodson, nom. nov.
Roulinia Palmeri S.Wats. Proc. Amer. Acad. **18**: 115.
1883, non *Cynanchum Palmeri* (Wats.) Blake (*Pat-
talias Palmeri* Wats.).
Rouliniella Palmeri (S.Wats.) Vail, Bull. Torrey Club **29**:
664. 1902.

Ampelamus, *Rouliniella*, and *Mellichampia* can be recognized as genera only by extremely tenuous criteria. As far as I am aware, the first would have to be supported by the bifid corona segments and the rostrate stigma head; the second by a flat (or scarcely conical) stigma head and acuminate crown segments, although they are slightly emarginate in some species and not infrequently show a tendency toward the development of marginal lobules; the third would have to depend upon *somewhat* larger flowers than *Rouliniella*, *somewhat* more nearly campanulate corollas, and crown segments *somewhat* more united at the base. *Mellichampia* also has a stigma head intermediate between that of *Ampelamus* and that of *Rouliniella*. The crown segments of *Ampelamus* and of *Mellichampia* are flat; those of *Rouliniella* are usually *somewhat* cucullate or infolded at the base.

The primary division of the key to subgenera advocated here is one that will have to be used in some cases with a certain degree of experience, if not prejudice. Whilst the inflorescence of the *Mellichampia*-complex may be described as racemiform generally, and that of the *Metastelma*-complex as umbelliform, ambiguous species occur in both groups quite frequently enough to support my contention that it is impractical to maintain a series of distinct genera. Whilst the flowers of the *Mellichampia*-complex are smaller, as a rule, than those of the *Metastelma*-complex, this is in the nature of a guiding "prejudice" only. I have been unable to discover supporting structural characters of merit.

SUBGENUS 2. AMPELAMUS

CYNANCHUM LAEVE (Michx.) Pers. Syn. 1: 274. 1805.

Gonolobus laevis Michx. Fl. Bor. Am. 1: 119. 1803.

Enslenia albida Nutt. Gen. N.Am. Pl. 1: 165. 1818.

Ampelanus albidus (Nutt.) Britton, Bull. Torrey Club 21: 314. 1894.

The interpretation of this species has been singularly confused. In 1803 Michaux (loc. cit.) founded *Gonolobus* with three species, two of which previously had constituted the whole complement of the earlier genus *Vincetoxicum* Walt.

(Fl. Carol. 104. 1788): *G. macrophyllus* (*V. gonocarpos* Walt.), and *G. hirsutus* (*V. acanthocarpus* Walt.). The third species, *G. laevis*, originated with Michaux.

It is important in this connection to emphasize certain morphological characters of the fruit as embodied in the generic and specific descriptions by Michaux. For the genus as a whole: "*Folliculi plerumque costati seu angulosi. . .*" The follicles of the three species were described as follows: *G. macrophyllus*—"folliculis costato-angulosis"; for *G. hirsutus*—"folliculis oblongis, sparsim muricatis"; but for *G. laevis*—"folliculis laevibus." It is obvious that the smooth condition of the fruit of *G. laevis*—not angled as in *macrophyllus*, nor muricate as in *hirsutus*—was particularly outstanding in the estimation of Michaux, and that it suggested the specific adjective itself.

The type specimens of *G. laevis*, if they may be called such, have been examined both by Dr. Gray (Proc. Amer. Acad. Sci. **12**: 75. 1877) and by Miss Vail (Bull. Torrey Club **26**: 427. 1899), and both agreed that at least two elements are represented amongst the fragments, namely, flowers and angled fruits of *G. suberosus* (L.) R.Br.—of which *G. macrophyllus* Michx. (*G. gonocarpos* (Walt.) Perry) probably is no more than a variety—and leaves of the slender vine currently known as *Enslenia albida* Nutt. or *Ampelanus* (correctly *Ampelamus*) *albidus* (Nutt.) Britton. But Dr. Gray chose the flowers and fruit as authentic, whilst Miss Vail chose the leaves. At first glance Miss Vail's selection may appear to be with little foundation, until it is recalled that Michaux stipulated for his species "*folliculis laevibus,*" exactly the condition of *Ampelamus*; and that in choosing the material with angled pods, Dr. Gray denied the diagnostic character of the species. In such an instance, of obviously accidental mixture, the evident solution is to accept, as typical, material known to coincide with the original literature.

Had she studied her problem under existing rules of nomenclature, Miss Vail certainly would have placed *laevis* in a new combination under *Ampelamus*. Under the interpretations current at the New York Botanical Garden during that

time, however, she invoked the "Doctrine of Residues," returning *G. macrophyllus* and *G. hirsutus* to *Vincetoxicum* Walt., from which they had been taken by Michaux, and retaining the name *Gonolobus* for *G. laevis*.

In this connection, however, it should be noted that Michaux embodied in his diagnosis of *Gonolobus* two characters which do not coincide with the present interpretation of *G. laevis*: "*Stylus discoideo-5-gonus. . . Folliculi plerumque costati seu angulosi.*" The absence of a "Doctrine of Residues" notwithstanding, therefore, I feel that Miss Perry (*Rhodora* 40: 283. 1938) is quite correct in considering the Walterian element as typical of *Gonolobus*, choosing *G. macrophyllus* as the standard species. Nevertheless, one feels that sentiment may have induced her to perpetuate Dr. Gray's interpretation of *G. laevis* rather than the more logical conclusion of Miss Vail.

Although it does not bear directly upon the question of *G. laevis*, it might be well to explain here, for future reference, that although *Vincetoxicum* Walt. clearly antedates *Gonolobus* Michx., as well as *Vincetoxicum* Moench (*Meth.* 717. 1794), the nomenclatorial powers at Kew, invoked by Miss Perry (*loc. cit.* 281-282. 1938), "temporarily" have placed *Vincetoxicum* Moench on the list of *Nomina Conservanda*, tantamount to final acceptance, since "the European *Vincetoxicum* is so widely used that there is every chance of its being conserved" (passage of letter by Mrs. T. A. Sprague, as quoted by Miss Perry). I suspect that the European Asclepiadologists, having had *Vincetoxicum* Moench conserved for them, will scarcely know how to use it: its distinction from *Cynanchum* is extremely evasive.

SUBGENUS 3. METALEPIS

CYNANCHUM **cubense** (Griseb.) Woodson, comb. nov.

Metalepis cubensis Griseb. *Cat. Pl. Cub.* 179. 1866.

The inclusion of *Metalepis* within the Gonolobeae by Schumann (in Engl. & Prantl, *Nat. Pflanzenfam.* 4²: 297. 1895) is a conspicuous instance of the ambiguity of the current definitions of the tribes of Asclepiadaceae. The pollinia in the species of this subgenus are quite pendulous, with the equally

rounded surfaces characteristic of the Asclepiadeae, but the translators are very long and horizontal, a condition found exactly duplicated in a few species of the subgenus *Mellichampia*. Aside from this character, the subgenus depends upon the racemiform inflorescences and the cyathiform corona, the inadequacy of which, as generic characters, has been noted previously.

SUBGENUS 4. TYLODONTIA

CYNANCHUM **Grisebachii** (Maza) Woodson, comb. nov.

Tylo dontia cubensis Griseb. Cat. Pl. Cub. 179. 1866, non *Cynanchum cubense* (Griseb.) Woodson (*Metalepis cubensis* Griseb.).

Astephanus Grisebachii Maza, Cat. Periant. 276. 1894.

Tylo dontia has been included as a synonym under *Astephanus* by Schumann (in Engl. & Prantl, Nat. Pflanzenfam. 4²: 224. 1895), but dissection of flowers from an isotype (*Wright 2964*) in the herbarium of the Missouri Botanical Garden shows the presence of a corona of five erose, truncated scales. The subgenus is outstanding in the *Mellichampia*-complex because of the small flowers having urceolate corollas with sharply reflexed lobes.

SUBGENUS 5. METASTELMA

At present I do not feel sufficiently familiar with the synonymy of *Metastelma* to attempt the many nomenclatural changes necessary for inclusion in *Cynanchum*. This is the most difficult of the American groups of Asclepiads because the flowers are so small. Within the tiny corollas, averaging only about 2 mm. in length, are packed as many structural details and variations as within the larger flowers of other genera. Once when I was complaining to Dr. Standley of the eye and nerve strain necessary in dealing with the group, he laughingly agreed that it should be studied by an algologist or a mycologist.

Metastelma will be handled very much easier, I believe, if it is treated as a single subgenus under *Cynanchum*. Unquestionably the various entities included here are much more closely related to one another than to any other complex. The

whole aspect of the plants is so unmistakable that I feel, even with convenience particularly in mind, that "lumping" is natural as well.

As has been remarked in a previous paragraph, *Astephanus* is difficult to maintain upon a sure foundation even with the higher powers of a binocular dissecting microscope. Amongst several specimens ascribed to *A. pubescens* Greenm. in the herbarium of the Missouri Botanical Garden are two entities, one with a manifest corona and one without, the anthers of the two species differing considerably; yet the superficial aspects of the plants are all but undistinguishable. Natural genera should not be so easily confused.

Many readers may be surprised at the inclusion of *Ditassa* and *Decastelma* with *Metastelma*. But the cleaving of the corona scales or the presence of a ventral tooth or ligule, which distinguish these entities from *Metastelma* (sensu stricto), are found amongst the Old World *Cynancha* as well as in the *Mellichampia*-complex of Central America. Similar variation also is found in *Asclepias*.

SUBGENUS 6. CLEISTOLOBUS

CYNANCHUM **utahense** (Engelm.) Woodson, comb. nov.

Astephanus utahensis Engelm. Amer. Nat. 9: 349. 1875.

The inflexed-cucullate corolla lobes of this species, unlike those of any other known to me, were interpreted by Dr. Engelmann as a modification to compensate for the absence of a corona.

IV. BLEPHARODON Dcne. in DC. Prodr. 8: 603. 1844.

The nine species assigned to *Blepharodon* by Decaisne fall into two groups superficially marked by voluble or erect herbaceous habits, but accompanied by interesting differences in the corona and pollinia as well. Although I may seem inconsistent in view of my treatment of generic lines generally in this family, I feel that two distinct genera may be represented. The North American species are all of the voluble group (with the exception of *B. neriifolium* Dcne., which I believe

probably will be found to be an *Asclepias* when the material is available for study), and since this group seems to have been more typical of the genus in the opinion of Decaisne, I am reserving the use of the generic name for that connection. In respect for the memories of the many genera that I have reduced to synonymy during these studies, I am deferring judgment on the generic status of the erect species until I have the opportunity to devote my attention to the South American Asclepiads.

V. SARCOSTEMMA R.Br. Mem. Wern. Soc. 1: 50. 1809.

Philibertia HBK. Nov. Gen. 3: 195. 1819.

Pentagonium Schauer, Nova Acta Acad. Caes. Leop. Nat. Cur. 19. Suppl. 1: 364. 1843.

Zosima Phil. Sert. Mendoz. Alt. 29. 1871.

Funastrum Fourn. Ann. Sci. Nat. Bot. vi. 14: 388. 1882.

Cystostemma Fourn. in Mart. Fl. Bras. 6⁴: 204. 1885.

Philibertella Vail, Bull. Torrey Club 24: 305. 1897.

Ceramanthus Malme, Ark. Bot. 4¹⁴: 2. 1905.

A few additional synonyms will have to be added from the South American flora. I am very reluctant to disregard Schlechter's separation of *Philibertia* and *Funastrum* (in Fedde, Repert. 13: 279–287. 1915), but feel that it is necessary to do so in order to maintain balance within the family. As far as I am aware, the only character really separating the two entities, upon the basis of present speciation, is the structure of the corolla, whether campanulate with shallow lobes in the former, or rotate with more deeply divided lobes in the latter. Other definitive structures apparently are lacking, and the striking similarity, if not identity, of the anther, pollinia, and corona characters is impressive. The high attachment of the corona bladders to the anthers, cited by Schlechter for *Philibertia*, manifestly does not hold. The annulus connecting the bladderly corona segments is usually more pronounced in *Funastrum* than in *Philibertia*, but is present in both. *Sarcostemma*, currently interpreted as including only Old World species, was erected by Robert Brown to include species now

relegated to *Funastrum* and *Philibertia* as well. I can find no tangible distinction between the three, although they were placed in different subtribes by Schumann, as has been explained previously. Few North American species have been described since the prevalence of the restricted definition of *Sarcostemma*, and only the following transfers appear to be necessary:

SARCOSTEMMA tomentella (Brandg.) Woodson, comb. nov.

Philibertia tomentella Brandg. Univ. Cal. Publ. Bot. **4**: 90. 1910.

SARCOSTEMMA Torreyi (A.Gray) Woodson, comb. nov.

Philibertia Torreyi A.Gray, Proc. Amer. Acad. **12**: 64. 1877.

Philibertella Torreyi (A.Gray) Vail, Bull. Torrey Club **24**: 309. 1897.

Funastrum Torreyi (A.Gray) Schltr. in Fedde, Repert. **13**: 287. 1915.

VI. MATELEA Aubl. Fl. Guian. **1**: 277. *t.109*. 1775.

Hostea Willd. Sp. Pl. **1**: 1274. 1798.

Macroscepis HBK. Nov. Gen. **3**: 200. 1819.

Pherotrichis Dcne. Ann. Sci. Nat. Bot. ii. **9**: 322. 1838.

Ibatia Dcne. in DC. Prodr. **8**: 599. 1844.

Polystemma Dcne. loc. cit. 602. 1844.

Dictyanthus Dcne. loc. cit. 604. 1844.

Chthamalia Dcne. loc. cit. 605. 1844.

Ptycanthera Dcne. loc. cit. 606. 1844.

Trichosacme Zucc. Abh. Akad. Wiss. München **4**²: 11. 1845.

Tympananthe Hassk. Flora **30**: 757. 1847.

Rytidoloma Turcz. Bull. Soc. Nat. Mosc. **25**²: 319. 1852.

Callaeolepium Karst. Fl. Col. **2**: 123. 1865.

Poicilla Griseb. Cat. Pl. Cub. 176. 1866.

Himantostemma A.Gray, Proc. Amer. Acad. **20**: 294. 1885.

Rothrockia A.Gray, loc. cit. 295. 1885.

Tetracustelma Baill. Hist. Pl. **10**: 292. 1891.

Urostephanus Robins. & Greenm. Amer. Journ. Sci. iii. **50**: 159. 1895.

- Prosthecidiscus* Donn.Sm. Bot. Gaz. **25**: 149. 1898.
Labidostelma Schltr. Bull. Herb. Boiss. ii. **6**: 843. 1906.
Microdactylon Brandg. Zoe **5**: 252. 1908.
Amphorella Brandg. Univ. Cal. Publ. Bot. **4**: 91. 1910.
Poicillopsis Schltr. in Urb. Symb. Ant. **7**: 339. 1912.
Pachystelma Brandg. Univ. Cal. Publ. Bot. **7**: 330. 1920.
Cyclodon Small, Man. Fl. 1075. 1933.
Odontostephana Alexander, in Small, loc. cit. 1076. 1933.
Edisonia Small, loc. cit. 1078. 1933.
Heliostemma Woodson, Amer. Journ. Bot. **22**: 689. 1935.
Gonolobus and *Vincetoxicum* of North American authors, in large part.

To this imposing list of synonyms eventually will have to be added numerous generic names from the South American flora. Very few of these entities are strictly co-extensive, nearly all having been based upon some more or less striking variation of the corona. Loud protestations probably will be made by botanists familiar with such extremes as *Dictyanthus* and *Macroscepis* that at least those familiar genera should be allowed to stand inviolate, but I should like to lay a curse on the man who revives them without at least as much study as I have devoted. And I feel compelled to enjoin all future systematists to ponder long and deeply the intricacies of the gonoloboid corona before proposing additional novelties.

The corona of *Matelea*, as is almost universal in the Cynanchoideae, consists of a unit enation of the anther filament, fundamentally subtending an additional enation (such as the hood and horn, respectively, of most species of *Asclepias*). The outer units may be separate, essentially entire, or with variously elaborated marginal lobules; at other times they may be conerescent into an inconspicuous, fimbriate skirt at the base of the gynostegium, into a ring, or into a massive rotate disc adnate to the corolla throat. The inner units may be small appendages of the anther head stipe rather high above the outer units, or may be combined, either essentially free or completely adnate, with the outer units. The result is a kaleidoscopic medley that can be conveyed in print only by the use of critical illustrations for each of the dozens of species.

At one time during the studies which preceded this paper, an intensive study was made of the anther structure of the Gonoloboids, for I felt that the position of the anthers with respect to the stigma head (whether beneath or about the margin) would aid in the establishment of some of the favorite genera apparently doomed to synonymy. Here numerous trends were obvious, but nothing of sufficient stability for generic distinction. A long consideration of pollinium structure also was ended in rather bitter frustration.

A peculiar vegetative character which links practically all the species groups of *Mateleia* (although by no means every species of the groups) is the mixed indument consisting of long eglandular hairs and short, bulbous emergences. These emergences usually appear to be somewhat glandular, and may be white, dark brown, or black. Since no other group of Asclepiads with which I am familiar possesses such an indument, with the exception of the closely neighboring *Fischeria* maintained provisionally and with some misgivings, I regard its occurrence in *Mateleia* as extremely significant. I am convinced that the elements which I have included in that genus are inextricably related.

Heretofore, *Mateleia* has been a genus of perhaps four South American species poorly represented in North American herbaria. Its expansion as advocated here consequently entails a shocking number of new combinations. Only a few of the generic synonyms (such as *Macroscepis* and *Dictyanthus*) contain as many as half a dozen species, however, and in view of that fact and the many nomenclatural changes necessary in any event it seems scarcely worth while to ask conservation for any of those names. Then, too, such a drastic reformation may better be served by a poorly known generic name than by one with more definitely established associations.

Recent tropical American collections are bringing to light more novelties in *Mateleia* than perhaps in any other genus of Asclepiads. Therefore I have prepared the following key to subgenera and sections, both to illustrate the reformation of the genus and as a temporary aid to herbarium study. I have treated several groups as subgenera simply because they have

familiar names and in spite of the fact that their characters are less important than certain others which are treated as sections, having no previous generic name (for I am wary of treating them as nouns lest some floristic student raise them to genera). As accumulation of Asclepiads from tropical North America proceeds, additional entries will have to be inserted in the key. That should accentuate the greater convenience of an ultra-conservative generic concept. As a final word, it should be emphasized that the species groups show great variation amongst their constituents, and that they cannot safely be raised to generic rank as they now exist. Certain species show affinities for more than one group. Where I have made an arbitrary disposition in such cases I usually have included notes or references to aid their identification.

KEY TO THE SUBGENERA AND SECTIONS

- A. Pollinia more or less descending from the translator arms.
 - B. Corolla subcampanulate-rotate, without a faucal annulus, the limb merely continuing the dilation of the throat and much longer than it; corona annular, the 5 constituent segments usually distinctly 3-lobed; pollinia frequently prolonged beyond the attachment of the translator arms, excavated on one face only.....1. IBATIA
 - BB. Corolla very broadly campanulate, the lobes very broad and scarcely as long as the shallow open throat, without a faucal annulus; corona rotate, of 5 segments consisting of 2 falcate outer lobes and a median inflexed lobule; pollinia conspicuously excavated on both faces.....2. LABIDOSTELMA
 - BBB. Corolla salverform-rotate, usually with a faucal annulus, the limb abruptly spreading or somewhat reflexed from the short tube.
 - C. Corolla lobes without caudate appendages; corona of 5 digitate segments adnate to the corolla tube, each with a more or less distinct callous boss supporting the stigma head; pollinia without apical processes; plants variously pubescent, but not white-woolly.....3. MACROSCEPIS
 - CC. Corolla lobes with long plumose caudate appendages; corona annular, shallowly 5-lobed, each lobe with an inconspicuous internal ligule; pollinia with a slender apical process; entire plant very densely white-woolly.....4. TRICHOSACME
- AA. Pollinia essentially horizontal, but occasionally arcuate, with the tips somewhat ascending or descending.
 - B. Antillean species (corolla rotate; if deeply campanulate, see *Pachystelma*).

- C. Corona of 5 broad barely united segments each bearing a conspicuous incurved hook or ligule; anther head very shortly stipitate
.....5. POICILLA
- CC. Corona not as above.....6. PTYCANTHERA
- D. Anther head distinctly stipitate.....§. *Pauciflorae*
- DD. Anther head absolutely sessile.....§. *Variifoliae*
- BB. Continental species.
- C. Pollinia subquadrate- or oblong-reniform with a narrow hyaline margin; corona of 5 more or less united segments each with an internal ligule or boss.....7. CHTHAMALIA
- CC. Pollinia falciform or arcuate, the tips markedly ascending, hyaline margins or indentations inconspicuous or lacking.
- D. Erect or prostrate herbs; corolla lobes ascending.
- E. Corolla rotate-subcampanulate, the orifice not constricted; corona segments not strongly adnate to the corolla throat
.....8. PHEROTRICHIS
- EE. Corolla urceolate-campanulate, the orifice markedly constricted; corona strongly adnate to the corolla throat...9. AMPHORELLA
- DD. Lianas or twining undershrubs (except *M. caudata*); corolla lobes reflexed or spreading.
- E. Corolla rotate, with long narrow ascending lobes; corona of 5 nearly separate pectinate segments; anther head with a definite appendiculate stipe.....10. TIARASTEMMA
- EE. Corolla deeply campanulate, with relatively broad ascending lobes; corona of 5 fimbriately compound segments; anther head sessile.....11. POLYSTEMMA
- EEE. Corolla subcampanulate-rotate, with relatively broad widely spreading or reflexed lobes; corona of 5 broad, more or less carunculate segments usually strongly adnate to the corolla throat; anther head sessile.....12. HELIOSTEMMA
- CCC. Pollinia subtriangular-pyriform, with a conspicuous hyaline indentation or margin and broad winged translator arms.
- D. Corolla rotate to subcampanulate-rotate; anther head round to very broadly 5-gonal; corona more or less annular or rotate.....
-13. EUMATELEA
- E. Corolla without a faucal annulus exterior to the true corona.
- F. Anther head with a strongly manifest fluted stipe..§. *Reticulatae*
- FF. Anther head essentially sessile; corona with 5 broad partitions superposed.
- G. Corona light and intricately fimbriate.....§. *Violaceae*
- GG. Corona dark and carunculate.....§. *Pseudobarbatae*
- EE. Corolla throat with an interrupted 5-angled faucal annulus exterior to the true corona.....§. *Viridiflorae*
- DD. Corolla deeply campanulate; anther head saliently 5-gonal; corona of 5 simple or compound digitate segments.
- E. Corona segments digitately compound, adnate to the column but essentially free from the corolla; corolla lobes strikingly pilose-barbate within.....14. MICRODACTYLON

- EE. Corona segments simply digitate or merely somewhat carunculate, adnate to the corolla throat at least at the base; corolla lobes essentially glabrous within.
- F. Corona lobes relatively short and thick, adnate to the corolla only at the base; corolla lobes flat.....15. PACHYSTELMA
- FF. Corona lobes long and narrow, wholly adnate to the corolla throat and imbedded in similarly shaped fleshy corolline excrescences; corolla lobes sharply revolute, especially at the base.....16. DICTYANTHUS

SUBGENUS 1. IBATIA

- MATELEA **araneosus** (Donn.Sm.) Woodson, comb. nov.
Gonolobus araneosus Donn.Sm. Bot. Gaz. **47**: 257. 1909.
- MATELEA **atrocoronata** (Brandg.) Woodson, comb. nov.
Vincetoxicum atrocoronatum Brandg. Univ. Cal. Publ. Bot. **6**: 372. 1917.
- MATELEA **chrysantha** (Greenm.) Woodson, comb. nov.
Gonolobus chrysanthus Greenm. Proc. Amer. Acad. **32**: 299. 1897.
Vincetoxicum chrysanthum (Greenm.) Standl. Contr. U.S. Nat. Herb. **23**: 1190. 1924.
- MATELEA **cordifolia** (A.Gray) Woodson, comb. nov.
Rothrockia cordifolia A.Gray, Proc. Amer. Acad. **20**: 295. 1885.
- MATELEA **fruticosa** (Brandg.) Woodson, comb. nov.
Rothrockia fruticosa Brandg. Zoe **5**: 165. 1903.
- MATELEA **gonoloboides** (Robins. & Greenm.) Woodson, comb. nov.
Urostephanus gonoloboides Robins. & Greenm. Amer. Journ. Sci. iii. **50**: 159. 1895.
- MATELEA **inconspicua** (Brandg.) Woodson, comb. nov.
Gonolobus inconspicuus Brandg. Univ. Cal. Publ. Bot. **3**: 387. 1909.
- MATELEA **maritima** (Jacq.) Woodson, comb. nov.
Cynanchum maritimum Jacq. Stirp. Amer. 83. pl.56. 1763.
Gonolobus maritimus (Jacq.) R.Br. Mem. Wern. Soc. **1**: 35. 1809.
Gonolobus floccosus Bertol. Opusc. **4**: 521. 1823.
Gonolobus suberosus Spreng. Syst. **1**: 846. 1825, non R.Br.

- Ibatia maritima* (Jacq.) Dene. in DC. Prodr. **8**: 599. 1844.
Lachnostoma maritimum (Jacq.) Nichols. Dict. Gard. **2**:
 236. 1884.
Ibatia muricata Griseb. Fl. B.W.I. 421. 1861.
- MATELEA **mollis** (Griseb.) Woodson, comb. nov.
Ibatia mollis Griseb. Cat. Pl. Cub. 177. 1866.
Lachnostoma molle (Griseb.) Maza, Cat. Periant. 276.
 1894.
Ptychanthera mollis (Griseb.) Schltr. in Urb. Symb. Ant.
1: 280. 1899.
- MATELEA **patalensis** (Donn.Sm.) Woodson, comb. nov.
Gonolobus patalensis Donn.Sm. Bot. Gaz. **47**: 256. 1909.
- MATELEA **petiolaris** (A.Gray) Woodson, comb. nov.
Gonolobus petiolaris A.Gray, Proc. Amer. Acad. **21**: 397.
 1886.
Vincetoxicum petiolare (A.Gray) Standl. Contr. U.S. Nat.
 Herb. **23**: 1189. 1924.
- MATELEA **porphyrantha** (Standl.) Woodson, comb. nov.
Vincetoxicum porphyranthum Standl. ex Yuncker, Field
 Mus. Publ. Bot. **17**: 387. 1938.
- MATELEA **Pringlei** (A.Gray) Woodson, comb. nov.
Himantostemma Pringlei A.Gray, Proc. Amer. Acad. **20**:
 294. 1885.
- MATELEA **Prosthecidiscus** Woodson, nom. nov.
Prosthecidiscus guatemalensis Donn.Sm. Bot. Gaz. **25**:
 150. pl.12. 1898, non *Matelea guatemalensis* (K.Sch.)
 Woodson.
- MATELEA **pueblensis** (Brandg.) Woodson, comb. nov.
Vincetoxicum pueblensis Brandg. Univ. Cal. Publ. Bot. **4**:
 91. 1910.
- MATELEA **Purpusii** (Brandg.) Woodson, comb. nov.
Gonolobus Purpusii Brandg. Univ. Calif. Publ. Bot. **3**:
 387. 1909.
- MATELEA **tristiflora** (Standl.) Woodson, comb. nov.
Vincetoxicum tristiflorum Standl. Field Mus. Publ. Bot.
17: 272. 1937.
- MATELEA **umbellata** (Brandg.) Woodson, comb. nov.
Rothrockia umbellata Brandg. Zoe **5**: 165. 1903.

MATELEA Warscewiczii (Karst.) Woodson, comb. nov.

Callaeolepium Warscewiczii Karst. Fl. Col. 2: 123. pl. 165. 1865.

Fimbristemma Warscewiczii (Karst.) Benth. & Hook. Gen. Pl. 2: 768. 1876.

Ibatia is placed in the key as having "pendulous" pollinia since their vertical dimension is at least equal to the horizontal and usually is greater. Some confusion with *Chthamalia* is likely to occur, but may be avoided by a comparison of the coronas, that of the former subgenus being without internal ligules or bosses adnate to the segments and that of the latter always having such structures.

SUBGENUS 2. LABIDOSTELMA

MATELEA Quirosii (Standl.) Woodson, comb. nov.

Cynanchum rotatum Sesse & Mociño, Fl. Mex. 76. 1887, non Vell.

Labidostelma guatemalense Schltr. Bull. Herb. Boiss. ii. 6: 843. 1906, non *M. guatemalensis* (Donn.Sm.) Woodson.

Vincetoxicum Quirosii Standl. Field Mus. Publ. Bot. 18³: 959. 1938.

SUBGENUS 3. MACROSCEPIS

MATELEA calcicola (Greenm.) Woodson, comb. nov.

Gonolobus calcicola Greenm. Proc. Amer. Acad. 40: 30. 1904.

Vincetoxicum calcicola (Greenm.) Standl. Contr. U.S. Nat. Herb. 23: 1191. 1924.

MATELEA congesta (Dcne.) Woodson, comb. nov.

Gonolobus congestus Dcne. in DC. Prodr. 8: 597. 1844.

Vincetoxicum congestum (Dcne.) Standl. Contr. U.S. Nat. Herb. 23: 1189. 1924.

MATELEA congestiflora (Donn.Sm.) Woodson, comb. nov.

Cynanchum hirsutum Sesse & Mociño, Fl. Mex. 76. 1887, non Vell.

Macroscepis congestiflora Donn.Sm. Bot. Gaz. 25: 149. 1898.

MATELEA diademata (Edwards) Woodson, comb. nov.

Gonolobus diadematus Edwards, Bot. Reg. **3**: pl.252. 1817.

Vincetoxicum diadematum (Edwards) Standl. Contr. U.S. Nat. Herb. **23**: 1188. 1924.

MATELEA magnifolia (Pittier) Woodson, comb. nov.

Gonolobus magnifolius Pittier, Contr. U.S. Nat. Herb. **13**: 104. fig.13. 1910.

Vincetoxicum magnifolium (Pittier) Standl. loc. cit. **23**: 1188. 1924.

MATELEA obovata (HBK.) Woodson, comb. nov.

Macroscepis obovata HBK. Nov. Gen. **3**: 200. 1819.

SUBGENUS 4. TRICHOSACME

MATELEA lanata (Zucc.) Woodson, comb. nov.

Trichosacme lanata Zucc. Abh. Akad. Wiss. Munchen **4**²: 11. 1845.

An explanation, if not an apology, is in order for reducing *Trichosacme* from generic status. *M. lanata* is quite unmistakable because of the copious lanate pubescence and long plumose corolla lobes; but aside from these particulars it is manifestly intermediate between other groups, having somewhat the corona of *Chthamalia*, the pollinia of *Ibatia*, and the corolla (except the lobe appendages) of a miniature *Macroscepis*.

SUBGENUS 5. POICILLA

MATELEA ovatifolia (Griseb.) Woodson, comb. nov.

Poicilla ovatifolia Griseb. Cat. Pl. Cub. 177. 1866.

Ptychanthera ovatifolia (Griseb.) Schltr. in Urb. Symb. Ant. **1**: 279. 1899.

MATELEA tamnifolia (Griseb.) Woodson, comb. nov.

Poicilla tamnifolia Griseb. Cat. Pl. Cub. 176. 1866.

SUBGENUS 6. PTYCANThERA

§. *Pauciflorae*

MATELEA acuminata (Griseb.) Woodson, comb. nov.

Orthosia acuminata Griseb. Cat. Pl. Cub. 175. 1866.

Ptychanthera Berterii acc. to Schltr. in Urb. Symb. Ant. **1**: 279. 1899, non Dcne.

Poicilla acuminata (Griseb.) Schltr. loc. cit. 5: 469.
1908.

Poicillopsis acuminata (Griseb.) Schltr. loc. cit. 7: 339.
1912.

MATELEA **nipensis** (Urb.) Woodson, comb. nov.

Gonolobus nipensis Urb. Symb. Ant. 9: 421. 1925.

MATELEA **oblongata** (Griseb.) Woodson, comb. nov.

Orthosia oblongata Griseb. Cat. Pl. Cub. 176. 1866.

Ptychanthera oblongata (Griseb.) Schltr. in Urb. Symb.
Ant. 1: 280. 1899.

Poicilla oblongata (Griseb.) Schltr. loc. cit. 5: 470.
1908.

Poicillopsis oblongata (Griseb.) Schltr. loc. cit. 7: 339.
1912.

MATELEA **pauciflora** (Spreng.) Woodson, comb. nov.

Gonolobus pauciflorus Spreng. Syst. 1: 846. 1825.

Ptycanthera Berterii Dcne. in DC. Prodr. 8: 606. 1844,
not acc. to Schltr. in Urb. Symb. Ant. 1: 279. 1899.

§. *Variifoliae*

MATELEA **bayatensis** (Urb.) Woodson, comb. nov.

Gonolobus bayatensis Urb. Symb. Ant. 9: 420. 1925.

MATELEA **Ekmanii** (Urb.) Woodson, comb. nov.

Gonolobus Ekmanii Urb. Symb. Ant. 9: 422. 1925.

MATELEA **Sintenisii** (Schltr.) Woodson, comb. nov.

Gonolobus Sintenisii Schltr. in Urb. Symb. Ant. 1: 288.
1899.

Vincetoxicum Sintenisii (Schltr.) Britton, Sci. Surv.
Porto Rico & Virgin Isl. 6: 100. 1925.

MATELEA **tigrina** (Griseb.) Woodson, comb. nov.

Gonolobus tigrinus Griseb. Pl. Wright. 520. 1862.

MATELEA **variifolia** (Schltr.) Woodson, comb. nov.

Gonolobus variifolius Schltr. in Urb. Symb. Ant. 1: 286.
1899.

Vincetoxicum variifolium (Schltr.) Britton, Sci. Surv.
Porto Rico & Virgin Isl. 6: 100. 1925.

The subgenus *Ptycanthera* was largely the deciding factor in the inclusive treatment of *Matelea* which I have adopted.

Were it not for the Antillean species, one might compose a fairly respectable key to several genera upon the continent, following generally the lines of the key to subgenera and sections of *Matelea* as it now appears. However, the Antillean species cut so sharply across most of the distinctions between the continental groups that the only way I can distinguish them from the latter in print is by the geographical factor. Were it not for their ambiguity with respect to the continental entities, one might obliterate *Ptycanthera* entirely, distributing §. *Pauciflorae* and §. *Variifoliae*, perhaps, to the continental subgenera *Eumatelea* and *HelioSTEMMA* respectively.

Variation of the corona in *Ptycanthera* appears largely to be responsive to the development of the anther head stipe. Where the latter is fairly pronounced, in § *Pauciflorae*, the corona adopts much the same fluted appearance with subtending skirt as in *Eumatelea* § *Reticulatae*; but where the anther head is sessile (§ *Variifoliae*), the corona becomes a rotate disc as in *HelioSTEMMA*, or a shallow 5-angled ring, in either case with 5 partitions, bosses, or hooks corresponding to the fluted buttresses of § *Pauciflorae*. In *M. Sintensisii* the compression of the anther head and corona apparently has led to the formation by the corolla throat of a rather prominent faucal annulus. The anther and pollinium structures are somewhat more variable even than in the continental species.

Yet, withal, the superficial aspect of the various species is so similar in most cases that I cannot but view them as extremely closely related, particularly in view of their restricted geographical distribution. The exasperations attendant upon their attempted segregation are illustrated graphically by Schlechter's vacillation between *Poicilla*, *Ptycanthera* (spelled *Ptychanthera* by him), *Poicillopsis*, and *Gonolobus*, with the familiar *Vincetoxicum-motif* supplied by Dr. Britton.

SUBGENUS 7. CHTHAMALIA

MATELEA **adenocardium** (Standl.) Woodson, comb. nov.

Vincetoxicum adenocardium Standl. Field Mus. Publ. Bot.
17: 267. 1937.

MATELEA **Baldwyniana** (Sweet) Woodson, comb. nov.

Gonolobus Baldwynianus Sweet, Hort. Brit. ed.2. 360. 1830.

Vincetoxicum Baldwinianum (Sweet) Britton, Mem. Torrey Club 5: 265. 1894.

Odontostephana Baldwiniana (Sweet) Alexander, in Small, Man. Fl. 1077. 1933.

MATELEA biflora (Raf.) Woodson, comb. nov.

Gonolobus biflorus Raf. New Fl. N. Amer. 4: 58. 1836.

Chthamalia biflora (Raf.) Dene. in DC. Prodr. 8: 605. 1844.

Vincetoxicum biflorum (Raf.) Heller, Contr. Herb. Franklin & Marshall Coll. 1: 79. 1895.

MATELEA brevicoronata (Robins.) Woodson, comb. nov.

Gonolobus parviflorus var. *brevicoronatus* Robins. Proc. Amer. Acad. 26: 169. 1891.

MATELEA camporum (Brandg.) Woodson, comb. nov.

Vincetoxicum camporum Brandg. Univ. Calif. Publ. Bot. 4: 185. 1911.

MATELEA carolinensis (Jacq.) Woodson, comb. nov.

Cynanchum carolinense Jacq. Coll. 2: 288. 1788.

Gonolobus carolinensis (Jacq.) R.Br. Mem. Wern. Soc. 1: 35. 1809.

Vincetoxicum carolinense (Jacq.) Britton, Mem. Torrey Club 5: 265. 1894.

Odontostephana carolinensis (Jacq.) Alexander, in Small, Man. Fl. 1077. 1933.

MATELEA cynanchoides (Engelm.) Woodson, comb. nov.

Gonolobus cynanchoides Engelm. in Engelm. & Gray, Boston Journ. Nat. Hist. 5: 251. 1845.

Vincetoxicum cynanchoides (Engelm.) Heller, Muhlenbergia 1: 2. 1900.

MATELEA decipiens (Alexander) Woodson, comb. nov.

Odontostephana decipiens Alexander, in Small, Man. Fl. 1077. 1933.

Gonolobus decipiens (Alexander) Perry, Rhodora 40: 286. 1938.

MATELEA flavidula (Chapm.) Woodson, comb. nov.

Gonolobus flavidulus Chapm. Bot. Gaz. 3: 12. 1878.

Gonolobus hirsutus var. *flavidulus* (Chapm.) A.Gray, Syn. Fl. ed.2, 2¹: 404. 1886.

Vincetoxicum flavidulum (Chapm.) Heller, Muhlenbergia 1: 2. 1900.

Odontostephana flavidula (Chapm.) Alexander, in Small, Man. Fl. 1078. 1933.

MATELEA **floridana** (Vail) Woodson, comb. nov.

Vincetoxicum floridanum Vail, Bull. Torrey Club 26: 428. 1899.

Odontostephana floridana (Vail) Alexander, in Small, Man. Fl. 1078. 1933.

MATELEA **Greggii** (Vail) Woodson, comb. nov.

Vincetoxicum Greggii Vail, Bull. Torrey Club 26: 431. 1899.

MATELEA **LeSueurii** (Standl.) Woodson, comb. nov.

Vincetoxicum LeSueurii Standl. Field Mus. Publ. Bot. 17: 270. 1937.

The pollinia of this species are not the subquadrate-reniform sort typical of *Chthamalia*, but are more nearly triangular-pyriform. Nevertheless, the affinities of *M. LeSueurii* unmistakably are with that subgenus, particularly with *M. Nummularia*.

MATELEA **Nummularia** (Dene.) Woodson, comb. nov.

Chthamalia Nummularia Dene. in DC. Prodr. 8: 605. 1844.

MATELEA **obliqua** (Jacq.) Woodson, comb. nov.

Cynanchum obliquum Jacq. Coll. 1: 148. 1786.

Gonolobus obliquus (Jacq.) R.Br. Mem. Wern. Soc. 1: 35. 1809.

Vincetoxicum obliquum (Jacq.) Britton, Mem. Torrey Club 5: 266. 1894.

Odontostephana obliqua (Jacq.) Alexander, in Small, Man. Fl. 1077. 1933.

MATELEA **parviflora** (Torr.) Woodson, comb. nov.

Lachnostoma (?) *parviflorum* Torr. Rept. Bot. Mex. Bound. Surv. 165. 1859.

Gonolobus parviflorus (Torr.) A.Gray, Proc. Amer. Acad. 12: 79. 1877.

Vincetoxicum parviflorum (Torr.) Heller, *Muhlenbergia*
1: 2. 1900.

MATELEA **parvifolia** (Torr.) Woodson, comb. nov.

Gonolobus parvifolius Torr. Rept. Bot. Mex. Bound. Surv.
166. 1859.

Gonolobus hastulatus A.Gray, Proc. Amer. Acad. 12: 78.
1877.

Vincetoxicum hastulatum (A.Gray) Heller, *Muhlenbergia*
1: 2. 1900.

Gonolobus californicus Jepson, Man. 771. 1925.

MATELEA **pedunculata** (Dcne.) Woodson, comb. nov.

Chthamalia pedunculata Dcne. in DC. Prodr. 8: 605. 1844.

MATELEA **producta** (Torr.) Woodson, comb. nov.

Gonolobus productus Torr. Rept. Bot. Mex. Bound. Surv.
165. 1859.

Vincetoxicum productum (Torr.) Vail, Bull. Torrey Club
26: 431. 1899.

MATELEA **prostrata** (Willd.) Woodson, comb. nov.

Cynanchum prostratum Willd. Sp. Pl. 1: 1257. 1798.

Gonolobus prostratus (Willd.) R.Br. Mem. Wern. Soc.
1: 35. 1809.

Lachnostoma prostratum (Willd.) Dcne. in DC. Prodr. 8:
602. 1844.

Tetracustelma prostrata (Willd.) Baill. Hist. Pl. 10: 292.
1891.

MATELEA **pubiflora** (Dcne.) Woodson, comb. nov.

Chthamalia pubiflora Dcne. in DC. Prodr. 8: 605. 1844.

Gonolobus pubiflorus (Dcne.) Engelm. in Engelm. & Gray,
Boston Journ. Nat. Hist. 5: 252. 1845.

Vincetoxicum pubiflorum (Dcne.) Heller, *Muhlenbergia* 1:
2. 1900.

Edisonia pubiflora (Dcne.) Small, Man. Fl. 1078. 1933.

MATELEA **Schaffneri** (A.Gray) Woodson, comb. nov.

Gonolobus Schaffneri A.Gray, in Hemsl. Biol. Centr.-Am.
Bot. 2: 334. 1882; A.Gray, Proc. Amer. Acad. 21: 399.
1886.

Gonolobus bifidus Hemsl. Biol. Centr.-Amer. Bot. 2: 330.
1882.

MATELEA Shortii (A.Gray) Woodson, comb. nov.

Gonolobus obliquus var. *Shortii* A.Gray, Syn. Fl. **2**¹: 104. 1878.

Vincetoxicum Shortii (A.Gray) Britton, Mem. Torrey Club **5**: 266. 1894.

Gonolobus Shortii A.Gray, Bot. Gaz. **8**: 191. 1883.

Odontostephana Shortii (A.Gray) Alexander, in Small, Man. Fl. 1077. 1933.

MATELEA stenopetala (A.Gray) Woodson, comb. nov.

Gonolobus stenopetalus A.Gray, Proc. Amer. Acad. **21**: 398. 1886.

Vincetoxicum stenopetalum (A.Gray) Standl. Contr. U.S. Nat. Herb. **23**: 1190. 1924.

MATELEA Vailiana Woodson, nom. nov.

Gonolobus acuminatus A.Gray, Proc. Amer. Acad. **21**: 399. 1886, non *Matelea acuminata* (Griseb.) Woodson.

Vincetoxicum acuminatum (A.Gray) Vail, Bull. Torrey Club **26**: 431. 1899.

MATELEA Wootonii (Vail) Woodson, comb. nov.

Vincetoxicum Wootonii Vail, Bull. Torrey Club **28**: 485. pl.30. 1901.

This is the characteristic group of *Matelea* in northern Mexico and the southern United States. The pollinia are well illustrated for the species "in the Manual Range" by Miss Perry (*Rhodora* **40**: pl.494. 1938) where the contrasting features of true *Gonolobus* pollinia are shown also. I believe that *Chthamalia* is perhaps most closely related to *Ibatia* amongst the subgenera of *Matelea*, the "pendulous" pollinia of the latter frequently appearing much like the "horizontal" pollinia of the former (merely of greater vertical dimension). The corona of the two subgenera, also, are much alike, but the internal ligules of the former are merely adnate (sometimes nearly free) to the outer segments, whereas the fusion is virtually complete in the latter.

SUBGENUS 8. PHEROTRICHIS

MATELEA Balbisii (Dcne.) Woodson, comb. nov.

Asclepias villosa Balb. Mem. Accad. Sci. Torino 7: 386.
1803, non Mill.

Cynanchum villosum (Balb.) R. & S. Syst. 6: 103. 1819.

Lachnostoma Balbisii Dcne. in DC. Prodr. 8: 602. 1844.

Gonolobus pogonanthus Hemsl. Biol. Centr.-Am. Bot. 2:
333. 1882.

Pherotrichis Balbisii (Dcne.) A.Gray, Proc. Amer. Acad.
21: 400. 1886; Syn. Fl. ed.2. 2¹: 462. 1886.

Pherotrichis Schaffneri A.Gray, loc. cit. 1886.

MATELEA **chihuahuensis** (A.Gray) Woodson, comb. nov.

Gonolobus chihuahuensis A.Gray, Proc. Amer. Acad. 21:
398. 1886.

Vincetoxicum chihuahuense (A.Gray) Standl. Field Mus.
Publ. Bot. 17: 270. 1937.

MATELEA **leptogenia** (Robins.) Woodson, comb. nov.

Pherotrichis leptogenia Robins. Proc. Amer. Acad. 29:
319. 1894.

SUBGENUS 9. AMPHORELLA

MATELEA **castanea** (Brandg.) Woodson, comb. nov.

Amphorella castanea Brandg. Univ. Calif. Publ. Bot. 4:
92. 1910.

SUBGENUS 10. TIARASTEMMA

MATELEA **calcarata** Woodson, comb. nov.

Vincetoxicum calcaratum Woodson, Amer. Journ. Bot.
22: 689. pl.1. fig.8. 1935.

MATELEA **belizensis** (Lundell & Standl.) Woodson, comb. nov.

Vincetoxicum belizense Lundell & Standl. in Standl. Field
Mus. Publ. Bot. 17: 268. 1937.

SUBGENUS 11. POLYSTEMMA

MATELEA **Decaisnei** Woodson, nom. nov.

Polystemma viridiflora Dcne. in DC. Prodr. 8: 602. 1844,
non *M. viridiflora* (G.F.W.Mey.) Woodson.

MATELEA **rupestris** (Brandg.) Woodson, comb. nov.

Polystemma rupestre Brandg. Univ. Cal. Publ. Bot. 7: 330.
1920.

MATELEA **scopulorum** (Brandg.) Woodson, comb. nov.

Polystemma scopulorum Brandg. Univ. Calif. Publ. Bot.
6: 189. 1915.

SUBGENUS 12. HELIOSTEMMA

MATELEA **caudata** (A.Gray) Woodson, comb. nov.

Gonolobus caudatus A.Gray, Proc. Amer. Acad. 21: 399.
1886.

Vincetoxicum caudatum (A.Gray) Standl. Contr. U.S.
Nat. Herb. 23: 1190. 1924.

MATELEA **crenata** (Vail) Woodson, comb. nov.

Vincetoxicum crenatum Vail, Bull. Torrey Club 26: 429.
1899.

This species might almost as well be placed in *Ibatia* upon the basis of the pollinia alone, for they are only slightly falciform. The corona segments, also, are scarcely typical of *Helio-stemma* in that they are not strongly adnate to the corolla throat. However, they do have a conspicuous internal boss which is characteristic of the latter subgenus and never found in the former.

MATELEA **cyclophylla** (Standl.) Woodson, comb. nov.

Vincetoxicum cyclophyllum Standl. Contr. U.S. Nat. Herb.
23: 1191. 1924.

MATELEA **nigrescens** (Schlecht.) Woodson, comb. nov.

Gonolobus nigrescens Schlecht. Linnaea 8: 522. 1833.

Vincetoxicum nigrescens (Schlecht.) Standl. Contr. U.S.
Nat. Herb. 23: 1192. 1924.

MATELEA **picturata** (Hemsl.) Woodson, comb. nov.

Gonolobus picturatus Hemsl. Biol. Centr.-Am. Bot. 2:
332. 1882.

MATELEA **pilosa** (Benth.) Woodson, comb. nov.

Gonolobus pilosus Benth. Pl. Hartw. 289. 1848.

Gonolobus atratus A.Gray, Proc. Amer. Acad. 22: 436.
1887.

Gonolobus suberiferus Robins. Proc. Amer. Acad. 27:
181. 1892.

Vincetoxicum Grayanum Standl. Contr. U.S. Nat. Herb.
23: 1191. 1924.

Vincetoxicum pilosum (Benth.) Standl. loc. cit. 1924.

Vincetoxicum suberiferum (Robins.) Standl. loc. cit. 1189. 1924.

Vincetoxicum quercetorum Standl. Field Mus. Publ. Bot. **17**: 271. 1937.

MATELEA Pittieri (Standl.) Woodson, comb. nov.

Vincetoxicum Pittieri Standl. Field Mus. Publ. Bot. **17**: 270. 1937.

Vincetoxicum discolor Woodson, Ann. Missouri Bot. Gard. **25**: 833. fig.1. 1938.

SUBGENUS 13. EUMATELEA

§. *Reticulatae*

MATELEA alabamensis (Vail) Woodson, comb. nov.

Vincetoxicum alabamense Vail, Bull. Torrey Club **30**: 178. pl.9. 1903.

MATELEA campechiana (Standl.) Woodson, comb. nov.

Vincetoxicum campechianum Standl. Carnegie Inst. Wash. Publ. 461: 82. 1935.

MATELEA Gentlei (Lundell & Standl.) Woodson, comb. nov.

Vincetoxicum Gentlei Lundell & Standl. Field Mus. Publ. Bot. **17**: 269. 1937.

MATELEA lanceolata (Dcne.) Woodson, comb. nov.

Gonolobus lanceolatus Dcne. in DC. Prodr. **8**: 598. 1844.

Vincetoxicum stenophyllum Standl. Contr. U.S. Nat. Herb. **23**: 1188. 1924.

MATELEA reticulata (Engelm.) Woodson, comb. nov.

Gonolobus reticulatus Engelm. ex A.Gray, Proc. Amer. Acad. **12**: 75. 1877.

Vincetoxicum reticulatum (Engelm.) Heller, Bot. Expl. Texas, 79. 1895.

MATELEA Tuerckheimii (Donn.Sm.) Woodson, comb. nov.

Gonolobus Tuerckheimii Donn. Sm. Bot. Gaz. **44**: 116. 1907.

Vincetoxicum trichoneuron Standl. ex Yuncker, Field Mus. Publ. Bot. **17**: 388. 1938.

MATELEA velutina (Schlecht.) Woodson, comb. nov.

Gonolobus velutinus Schlecht. Linnaea **8**: 521. 1833.

Vincetoxicum velutinum (Schlecht.) Standl. Contr. U.S. Nat. Herb. **23**: 1189. 1924.

§. *Pseudobarbatae*

MATELEA **guatemalensis** (K.Sch.) Woodson, comb. nov.

Gonolobus velutinus var. *calycinus* Donn.Sm. Bot. Gaz. **13**: 189. 1888.

Gonolobus guatemalensis K.Sch. in Engl. & Prantl, Nat. Pflanzenfam. **4**²: 302. 1895.

MATELEA **pinguifolia** (Standl.) Woodson, comb. nov.

Vincetoxicum pinguifolium Standl. Journ. Wash. Acad. Sci. **17**: 13. 1927.

MATELEA **pseudobarbata** (Pittier) Woodson, comb. nov.

Gonolobus pseudobarbatus Pittier, Contr. U.S. Nat. Herb. **13**: 105. *fig.14*. 1910.

Matelea nigrescens shows a strong affinity with this section, but has been placed in *HelioSTEMMA* because of its falciform pollinia.

§. *Viridiflorae*

MATELEA **grandiflora** (Standl.) Woodson, comb. nov.

Vincetoxicum grandiflorum Standl. Carnegie Inst. Wash. Publ. 461: 83. 1935.

MATELEA **viridiflora** (G.F.W.Mey.) Woodson, comb. nov.

Cynanchum viridiflorum G.F.W.Mey. Prim. Fl. Esseq. 141. 1818.

Gonolobus viridiflorus (G.F.W.Mey.) R. & S. Syst. **6**: 61. 1819.

Vincetoxicum viridiflorum (G.F.W.Mey.) Standl. Contr. U.S. Nat. Herb. **27**: 311. 1928.

This little group illustrates the maddening complications that result from attempts at segregation in the Gonolobeae. *M. viridiflora* and *M. grandiflora* quite obviously are very closely related, as evidenced particularly by the interrupted corolline annulus. Other characters, however, point strongly to relationship with other groups of *Matelea*, with the exception of the pollinia, which are scarcely similar to those of *Eumatelea*, and can be construed as "triangular-pyriform"

only with a considerable stretch of the imagination. But on the other hand, the pollinia of the two species are so dissimilar that I can find no descriptive term to cover both, and at the same time to distinguish them from *Eumatelea*.

SUBGENUS 14. MICRODACTYLON

MATELEA cordata (Brandg.) Woodson, comb. nov.

Microdactylon cordatum Brandg. Zoe 5: 252. 1908.

SUBGENUS 15. PACHYSTELMA

MATELEA bicolor (Britton & Wilson) Woodson, comb. nov.

Marsdenia bicolor Britton & Wilson, Bull. Torrey Club 50: 47. 1923.

Gonolobus bicolor (Britton & Wilson) Urb. Symb. Ant. 9: 421. 1925.

MATELEA crassifolia (Standl.) Woodson, comb. nov.

Vincetoxicum crassifolium Standl. Field Mus. Publ. Bot. 8: 36. 1930.

MATELEA megacarpa (Brandg.) Woodson, comb. nov.

Vincetoxicum megacarpum Brandg. Univ. Cal. Publ. Bot. 4: 381. 1913.

Pachystelma cordatum Brandg. loc. cit. 7: 330. 1920.

Dictyanthus brachistanthus Standl. Field Mus. Publ. Bot. 8: 38. 1930.

SUBGENUS 16. DICTYANTHUS

MATELEA altatensis (Brandg.) Woodson, comb. nov.

Gonolobus altatensis Brandg. Zoe 5: 244. 1908.

MATELEA ceratopetala (Donn.Sm.) Woodson, comb. nov.

Dictyanthus ceratopetalus Donn.Sm. Bot. Gaz. 18: 208. 1893.

MATELEA dictyantha Woodson, nom. nov.

Rytidoloma reticulata Turcz. Bull. Soc. Nat. Mosc. 25²: 320. 1852, non *Matelea reticulata* (Engelm.) Woodson.

Dictyanthus reticulatus (Turcz.) Benth. & Hook. Gen. Pl. 2: 765. 1876.

MATELEA diffusa Woodson, nom. nov.

Dictyanthus prostratus Brandg. Univ. Cal. Publ. Bot. 7: 329. 1920, non *Matelea prostrata* (Willd.) Woodson.

MATELEA **Hemsleyana** Woodson, nom. nov.

Dictyanthus parviflorus Hemsl. Biol. Centr. Am. Bot. **2**: 329. 1882, non *Matelea parviflora* (Torr.) Woodson.

MATELEA **Pavonii** (Dcne.) Woodson, comb. nov.

Dictyanthus Pavonii Dcne. in DC. Prodr. **8**: 605. 1844.

Tympananthe suberosa Hassk. Flora **30**: 758. 1847.

MATELEA **Standleyana** Woodson, nom. nov.

Dictyanthus tigrinus Conzatti & Standl. in Standl. Contr.

U.S. Nat. Herb. **23**: 1183. 1924, non *Matelea tigrina* (Griseb.) Woodson.

MATELEA **stapeliaeflora** (Reichb.) Woodson, comb. nov.

Dictyanthus stapeliaeflora Reichb. Sel. Sem. Hort. Dresden, 4. 1850.

MATELEA **tuberosa** (Robins.) Woodson, comb. nov.

Dictyanthus tuberosus Robins. Proc. Amer. Acad. **27**: 180. 1892.

MATELEA **yucatanensis** (Standl.) Woodson, comb. nov.

Dictyanthus yucatanensis Standl. Field Mus. Publ. Bot. **8**: 37. 1930.

Dictyanthus aeneus Woodson, Amer. Journ. Bot. **22**: 691. 1935.

I am very reluctant to merge *Dictyanthus* with *Matelea*, since the various species here show considerably more coherence and distinction than in other generic groups. However, generic lines cannot be drawn sharply due to such groups as *Pachystelma*, *Labidostelma*, and *Macroscepis*. The only really unique feature of *Dictyanthus* is that the faucal callus, or annulus, of the corolla is digitate, as are the segments of the corona. I am prepared for vigorous opposition from those who are accustomed to think of *Dictyanthus* as exemplified by *D. Pavonii*. *M. altatensis* provides a very suggestive link with either *Pachystelma* or *Eumatelea*, according to one's viewpoint at a particular time.

VII. FISCHERIA DC. Cat. Hort. Monsp. 112. 1813.

I am maintaining *Fischeria* with misgivings, and only provisionally, since its affinities with the broad interpretation of

Matelea are unmistakable, as shown particularly in the pollinium structure and the mixed indument with interspersed bulbous, glandular hairs. In the Central American species the corona appears outstanding, but is scarcely different from that of *Eumatelea* § *Pseudobarbatae*. The anthers, also, show the inflated vesicular development mentioned in the key to genera. But in *F. viridis* Moldenke, recently discovered in Colombia, the corona is resolved into a more typical structure for *Matelea*, and the anthers are not vesicular. Should more species comparable to *F. viridis* appear in the rich South American flora, it is difficult to foresee what characters could be found to support the genus other than the crisped corolla lobes. Since *Fischeria* is not well represented in North America, the species there being quite easily distinguished, I am leaving the question of its validity until I am more familiar with the South American congeners.

VIII. GONOLOBUS Michx. Fl. Bor. Am. 1: 119. 1803.

Vincetoxicum Walt. Fl. Carol. 13, 104. 1788, non Moench.

Fimbristemma Turcz. Bull. Soc. Nat. Mosc. 25²: 320. 1852.

Exolobus Fourn. in Mart. Fl. Bras. 6⁴: 318. 1885.

Trichostelma Baill. Hist. Pl. 10: 287. 1891.

Lachnostoma of North American authors.

The complications concerning the use of *Gonolobus* Michx. and *Vincetoxicum* Walt., the "temporary" conservation of *Vincetoxicum* Moench. over the latter, and the typification of *Gonolobus* by *G. gonocarpos* (Walt.) Perry have been discussed in previous paragraphs (p. 213). It may be remembered that the original element of *Vincetoxicum* Walt. (or *Gonolobus*, through the rejection of the earlier name) consists of two species, *G. gonocarpos* (Walt.) Perry, the type, and *G. carolinensis* (Jacq.) Schultes (*V. acanthocarpos* Walt.). Until recently no question has been raised against the consideration of these two species as congeneric, and *Gonolobus* became the general catch-all for gonoloboid species without sufficiently striking innovations of the corona to prompt their

designation as separate genera. At about the opening of the present century, however, the earlier *Vincetoxicum* Walt. was revived by Dr. Britton and Miss Vail at the New York Botanical Garden. Transfers from *Gonolobus* were then in order, and few species of the complex have been described for that genus since. It seems rather severe that American botanists now will have to adjust themselves anew to the conservation of the dubiously valid *Vincetoxicum* Moench of Europe.

In 1933 (in Small, Man. Fl. 1076.) E. J. Alexander separated *G. gonocarpos* and *G. carolinensis* generically, founding the genus *Odontostephana* with the latter, together with other species from the southeastern United States. Alexander quite naturally used *Vincetoxicum* Walt. in place of *Gonolobus*, the judgment of the authorities at Kew not yet having been passed. The key characters used to separate *Vincetoxicum* from *Odontostephana* were taken from the coronas, whether "Crown disk-like or saucer shaped, obscurely if at all ridged," or "Crown cup-shaped or incurved at the tip, usually crested or appendaged on the inner side." In the descriptions of the two genera, attention was called also to the characters of the fruits, longitudinally winged in the former, and muriculate in the latter, as observed by Walter in 1788. It is regrettable that *Odontostephana* is antedated by *Tetracustelma* Baill. if a narrow generic concept is adopted, and that a broad concept will submerge it in *Matelea* Aubl.

I have tried in vain to find characters of the corona which will separate *Gonolobus* and *Matelea*, but the structures of the anthers of the two genera appear to me as amply sufficient for distinction. The anthers of both vary considerably in size, position relative to the anther head, hyaline apical appendage, and nature of the marginal "wings." But in the species that I have assigned to *Gonolobus* the anther proper bears a more or less conspicuous, fleshy, usually laminate dorsal appendage which I never have found indicated to any degree in species assigned to *Matelea*. These dorsal appendages vary greatly from species to species, and although rather poorly developed as a rule in the temperate representatives, are very conspicu-

ous in the tropics. Typically, they are somewhat reniform in outline, but frequently deeply 2-lobed or entire, and rarely cleft into three divisions. The dorsal anther appendages are indicated in Alexander's figure for *Vincetoxicum* Walt. (loc. cit. 1933), although their significance is not mentioned, and a splendid illustration of them is provided by Baillon (Hist. Pl. 10: 235. fig. 177. 1891) for *G. erianthus*.

The dorsal anther appendages of *Gonolobus* have been overlooked in most species of North America, but they were made the chief foundation for the genus *Exolobus* by Fournier (cf. Mart. Fl. Bras. 6⁴: pl. 94. 1885), who designated them as "*corona superior*." The species assigned to *Gonolobus* by Fournier all are of the element represented by *G. hirsutus* Michx. which I am relegating to *Matelea*. K. Schumann (in Engl. & Prantl, Nat. Pflanzenfam. 4²: 298, 301-302. 1895) followed Fournier in the separation of *Gonolobus* and *Exolobus*, but appears to have been remarkably confused, for the dorsal anther appendages of my terminology are described as "inner corona" ("corona . . . innere an den A. befestigt, nach aussen strahlend, fleischig.") for the former, but for the latter simply as appendages of the anthers ("Stb. mit einem mittleren, fleischigen, nach aussen gerichteten Fortsatze. . .").

As I have explained previously (p. 199), flowers of *Gonolobus* as interpreted in this paper customarily have three structures which may be called "corona" if the terminology is loose: a corolline faucal annulus, frequently ciliate, a fleshy true corona borne at the base of the staminal column, and the dorsal appendages of the anthers proper. In his key to the Gonolobeae, Schumann (loc. cit. 298) places both *Gonolobus* and *Exolobus* under the division "II. Corona doppelt," and distinguishes them by "1. Äussere Corona kahl" and "2. Äussere Corona gewimpert," respectively, apparently referring to the corolline annulus.

In his descriptions of the two genera, however, Schumann reveals by his ambiguity how confused was his concept: "Corona ringförmig, einfach oder doppelt, die äussere zuweilen noch von einem häutigen Rande umgeben, so dass man fast 3

Coronen unterscheiden kann, oft ringförmig, der Blkr. angeheftet, kurz, gestutzt oder gelappt, zuweilen durch 5 Geweblplatten mit dem Gynostegium verbunden; innere an den A. befestigt, nach aussen strahlend, fleischig" (*Gonolobus*, p. 301); "Corona doppelt: äussere in der Form eines sehr niedrigen, behaarten, aus den Blkr. vortretenden Ringes, die innere aus 5 freien Schuppen bestehend, welche der Röhre des Gynostegiums angeheftet sind. Stb. mit einem mittleren, fleischigen, nach aussen gerichteten Fortsatze und einem häutigen Mittelbandanhang" (*Exolobus*, p.302). The *coup de grace* is given these verbal circumlocutions by a consideration of *fig. 92, N-T*, provided by Schumann (p.301) to illustrate *Gonolobus* and *Exolobus*. The floral structures are found to be equivalent in all important particulars, even to a "gewimpert corona" (ciliate corolline annulus) for *G. riparius*.

The extended quotations from Schumann should be sufficient to illustrate the ambiguity that results from treating the term "corona" in a complex sense. The dorsal anther appendages of *Gonolobus* are not equivalent to any structure found in *Matelea*. At one time during these studies, I suspected that they might represent the adnation to the anther of the inner ligules commonly accompanying the corona segments of the latter genus. This is shown to be erroneous, however, by the fact that these ligules almost invariably occur in *Gonolobus* in addition to the dorsal anther appendages, which apparently are more directly comparable to the vesicular tissue of the anthers of *Fischeria*.

I am not yet sufficiently informed to know positively what will result when this character is applied extensively to the South American gonoloboids, but wide observations indicate its validity. Supporting characters are found amongst the relatively few species of *Gonolobus* and *Matelea* for which fruit is known, the follicles of the former being longitudinally winged, infrequently quite smooth, and those of the latter muricate or infrequently smooth. The smooth condition would appear to be derived from both series. In *Matelea*, as has been explained previously, a peculiar indument of eglandular and

interspersed glandular hairs characteristically occurs; such an indument never is found in *Gonolobus*.

Amongst the North American species of *Gonolobus* with which I am familiar at present, the following divisions into subgenera appear both natural and convenient. As usual, I have illustrated them with necessary transfers.

KEY TO SUBGENERA

- A. Corolla with widely spreading or reflexed lobes, with a more or less pronounced fauceal annulus exterior to the true corona.
 B. Anthers only about half included beneath the broadly 5-gonal stigma head1. PTEROLOBUS
 BB. Anthers wholly (except the dorsal appendages) included beneath the saliently 5-gonal stigma head.....2. EUGONOLOBUS
 AA. Corolla with erect or ascending lobes, without a fauceal annulus.....
3. PSEUDOLACHNOSTOMA

I should like to include *Trichostelma* Baill. in this key either as a subgenus or as a section under *Eugonolobus*, but the height of the corolline annulus appears to be far too variable.

SUBGENUS 1. PTEROLOBUS

GONOLOBUS **chiapensis** (Brandg.) Woodson, comb. nov.

Vincetoxicum chiapense Brandg. Univ. Cal. Publ. Bot. **6**: 190. 1915.

In addition to the preceding, *Pterolobus* includes such species as *G. niger* R.Br., *G. Salvinii* Hemsl., and *G. nemorosus* Dcne. The name refers to the undulated wings of the follicles of the few species where I have observed them.

SUBGENUS 2. EUGONOLOBUS

GONOLOBUS **albomarginatus** (Pittier) Woodson, comb. nov.

Exolobus albomarginatus Pittier, Contr. U.S. Nat. Herb. **13**: 108. fig.16. 1910.

GONOLOBUS **aristolochiaefolius** (Brandg.) Woodson, comb. nov.

Fischeria aristolochiaefolia Brandg. Univ. Cal. Publ. Bot. **6**: 190. 1915.

GONOLOBUS **calycosus** (Donn.Sm.) Woodson, comb. nov.

Trichostelma ciliatum Baill. Hist. Pl. **10**: 288. 1891, non *G. ciliatus* Schltr.

Fimbristemma calycosa Donn.Sm. Bot. Gaz. **16**: 196. *pl.*
16. 1891.

GONOLOBUS **cteniophorus** (Blake) Woodson, comb. nov.
Vincetoxicum cteniophorum Blake, Contr. Gray Herb. 52:
84. 1917.

Vincetoxicum ? *tortum* Brandg. Univ. Cal. Publ. Bot. **10**:
414. 1924.

Vincetoxicum Lundellii Standl. Field Mus. Publ. Bot. **8**:
148. 1930.

GONOLOBUS **dasystephanus** (Blake) Woodson, comb. nov.
Vincetoxicum dasystephanum Blake, Contr. Gray Herb.
52: 84. 1917.

GONOLOBUS **Lasiostemma** (Hemsl.) Woodson, comb. nov.
Lachnostoma Lasiostemma Hemsl. Biol. Centr.-Am. Bot.
2: 335. 1882.

GONOLOBUS **oblongifolius** (Donn.Sm.) Woodson, comb. nov.
Trichostelma oblongifolium Donn.Sm. Bot. Gaz. **48**: 296.
1909.

GONOLOBUS **stenanthus** (Standl.) Woodson, comb. nov.
Vincetoxicum stenanthum Standl. Field Mus. Publ. Bot.
4: 255. 1929.

GONOLOBUS **stenosepalus** (Donn.Sm.) Woodson, comb. nov.
Fimbristemma stenosepala Donn.Sm. Bot. Gaz. **18**: 208.
1893.

SUBGENUS 3. PSEUDOLACHNOSTOMA

GONOLOBUS **arizonicus** (A.Gray) Woodson, comb. nov.
Lachnostoma arizonicum A.Gray, Proc. Amer. Acad. **20**:
296. 1885.

GONOLOBUS **gonoloboides** (Greenm.) Woodson, comb. nov.
Lachnostoma gonoloboides Greenm. Proc. Amer. Acad.
39: 84. 1903.

IX. MARSDENIA R.Br. Mem. Wern. Soc. **1**: 28. 1809.

Nephradenia Dcne. in DC. Prodr. **8**: 604. 1844.

Ecliptostelma Brandg. Univ. Cal. Publ. Bot. **6**: 371. 1917.

I have been unable to find characters to distinguish *Nephradenia* except the erect, fruticose habit. *Ecliptostelma molle*

Brandg. (loc. cit. 1917) is identical with *Marsdenia Gilgiana* Rothe, which seems to be an extraordinarily variable species, even from the present meager representation, and which possibly should be merged with the very closely neighboring *M. mexicana* Dcne. For further generic synonyms, reference should be made to the monograph by Rothe (in Engl. Bot. Jahrb. **52**: 354-434. 1915). Following that standard work, new sections or subgenera probably will have to be erected to include both the following species, although I am deferring that action for the present.

MARSDENIA astephanoides (A.Gray) Woodson, comb. nov.

Vincetoxicum astephanoides A.Gray, Proc. Amer. Acad. **22**: 435. 1887.

Cynanchum astephanoides (A.Gray) Standl. Contr. U.S. Nat. Herb. **23**: 1177. 1924.

MARSDENIA neriifolia (Dcne.) Woodson, comb. nov.

Blepharodon neriifolium Dcne. in DC. Prodr. **8**: 604. 1844.

Nephradenia neriifolia (Dcne.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 336. 1882.

Nephradenia fruticosa Donn. Sm. Bot. Gaz. **16**: 196. 1891.